TEACHING AGRICULTURAL VOCATIONS

A MANUAL FOR TEACHERS IN PREPARATION AND IN SERVICE

BY

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AND

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BOOKS ON EDUCATION

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PREFACE

This volume is designed especially for teachers and prospective teachers of agricultural vocations in schools and departments of secondary grade. Nearly a decade has passed since the setting up of a nation-wide program of vocational education under the stimulation of the Federal Vocational Education Act. The first programs of agricultural education under this Act reflected largely the methods of general education. Many books on methods of teaching were available, but few, if any, presented the point of view and the organization that the teaching of agricultural vocations demands. In recent years, a few books more nearly approaching the demands of this field have been added.

It has been the purpose of the authors to emphasize such methods as grow directly out of the activities of these vocations and at the same time to utilize the best that has accumulated in the field of general education. The suggestions made here are in keeping with the specific needs of the teacher of agriculture. The problems are stated entirely from the standpoint of one who would promote his professional standing by an analysis of his teaching practices.

The book has grown out of the needs and experiences of teachers of vocational agriculture as they have been observed from the standpoint of teacher training and State supervision. Briefly stated, the major problems which are considered are as follows:

(1) What are the purposes and functions of vocational education in agriculture?

(2) How shall the teacher guide pupils in the selection of vocational curricula?

(3) What type of organization shall be set up to accomplish the aims of agricultural education?

(4) How shall the curriculum and the course be constructed?

(5) What methods shall be used in teaching?

(6) How shall the pupil's progress be measured?

(7) How shall the teacher promote professional growth?

These problems are discussed from the point of view of the difficulties of the teacher at work. The plan is derived, as far as practicable, from the way in which teachers have faced these problems. The experience and criticism of teachers have been very helpful in the preparation of the volume.

At the close of each chapter is included an annotated but not exhaustive bibliography, intended to guide the teacher in further consideration of his special problems. In selecting the volumes and in preparing the notes, an effort has been made to choose assignments that bear specifically on the problems of the chapter. The use of this bibliography is in keeping with the suggestions made in the closing chapter of the book regarding the proper attitude of the teacher toward professional growth.

The authors desire to give credit to Dr. Geo. F. Warren for original work as expressed in farm management studies and their implications for agricultural education of secondary grade, and to Dr. T. H. Eaton for original work in the setting up of a basic philosophy of content selection derived from agricultural enterprises, farming activities, and natural teaching units. For helpful criticisms in the reading of the manuscript the authors are indebted to their colleagues, respectively, Geo. A. Works, Professor of Rural Education of the New York State College of Agriculture and Chairman of the Division of Education of Cornell University, and W. J. Weaver, State Supervisor in the Division of Vocational and Extension Education, State Department of Education; to A. M. Field, Professor of Agricultural Education of the College of Agriculture in the University of Minnesota; and to many others who have contributed in miscellaneous ways to the improvement of the text.

THE AUTHORS

CONTENTS

CHAPTER		PAGE
I.	Choosing Teaching as a Vocation	1
II.	Determining Aims and Functions of Agricultural Education	19
III.	Organizing the School	43
IV.	Understanding the Vocational Pupils	62
V.	Guiding Pupils in Curriculum Choices	92
VI.	Constructing Curricula and Courses of Study	102
VII.	Recognizing Method	158
VIII.	Planning the Lesson	171
IX.	Selecting Methods of Teaching	192
X.	Directing Supervised Farm Experience	203
XI.	Evaluating the Project as a Teaching Device	245
XII.	Using the Laboratory Method	264
XIII.	Utilizing Special Devices	274
XIV.	Conducting Class Instruction	299
XV.	Measuring the Pupil's Progress	328
XVI.	Growing Professionally	348
	Appendix	363
	Index	373

TEACHING AGRICULTURAL VOCATIONS

CHAPTER I

CHOOSING TEACHING AS A VOCATION

The choice of a vocation is one of the most important decisions that we are called upon to make. The growing complexity of civilization frequently makes this decision a perplexing one, since an efficient adjustment between aptitudes and vocational requirements is arrived at with considerable difficulty, and in many cases is not secured at all.

In considering the choice of a vocation, it is imperative that the qualifications required by the vocation constitute an essential factor. Such qualifications serve not only as a guide in the preparation for the vocation, but also as a basis upon which to check efficiency after one has entered it. Candidates for teaching should, therefore, consider carefully the qualifications required. These are of two types: (1) those relating to the candidate's personal and social qualities, to his interest in youth, and to his professional and scientific attitudes; and (2) those relating to his attitudes, his knowledge, and his skill as a specialized type of teacher. The former are involved in the decision to teach; the latter in the decision to teach a specialized type of work such as an agricultural occupation.

Among the many qualifications that all teachers should possess, three may well be emphasized:

1. The teacher should understand and stimulate youth.
2. The teacher should maintain a scientific and professional attitude.
3. The teacher should grow in knowledge and skill.

1. The teacher should understand and stimulate youth.—It is a generally accepted function of the teacher to determine what changes should be made in the characteristics of pupils and how these changes may be brought about. Whether we think of education as the adjustment of the individual to his environment, as the process of making individuals socially efficient, or as that of satisfying essential human needs, the teacher who is responsible for bringing about the changes must understand the nature of the pupils, the means by which they may be stimulated to respond properly, and the effects of the changes produced. The study of psychology has given us an insight into the original nature of pupils and the individual differences among them, and has furnished a basis for an understanding of the specific laws of learning and teaching. Such an analysis of the nature and potentialities of youth, and of the work of the instructor in providing the best possible setting for learning, lies at the foundation of successful teaching.

Providing the learning situation for pupils is a selective process, since there are countless ways of stimulating pupils and countless forms of response which may be made. These must be controlled, if educational aims are to be achieved economically by the teacher. As one increases his ability to understand the nature of pupils and to stimulate them to respond, one comes to realize that teaching is a fine art which is both socially useful and personally satisfying.

2. The teacher should maintain a scientific and professional attitude.—Concerning science, Dewey writes as follows:

By science is meant — that knowledge which is the outcome of methods of observation, reflecting and testing which are

deliberately adapted to secure a settled assured subject matter. It involves an intelligent and persistent endeavor to revise current beliefs so as to weed out what is erroneous, to add to their accuracy, and, above all, to give them such shape that the dependencies of the various facts upon one another may be as obvious as possible.[1]

Science represents the office of projection and control in new experience, pursued systematically, intensively, and on a scale due to freedom from limitation of habit. It is the sole instrumentality of conscious, as distinct from the accidental, progress.[2]

The effort to place education on a "scientific" basis has been substantially rewarded. Such statements as the above are quite comprehensive enough to include almost any systematic program of study relating to educational problems. The key to scientific method here presented is clearly to set an aim of achievement, make careful observations, reflect cautiously, and test results carefully. By such devices "conscious" progress is made.

The scientific point of view is essential to successful teaching; for persistent adherence to traditional practices, merely because they are old and therefore assumed to be good, interferes with progress and accentuates error, as do also the acceptance of opinions not substantiated by facts and the tendency to give information without accurate data. The true teacher is constantly on the search for the facts that affect the solution of his problems. He studies things, materials, men and society, for these. He accepts facts rather than opinions, and avoids snap judgments. He does not believe in luck or magic, but recognizes that the processes of human nature follow the law of cause and effect. "Rationalizing," or allowing his own feelings or desires to alter or influence his true interpretation of facts, is a tendency which he seeks to avoid.

1 Dewey, John, Democracy and Education, p. 256. The Macmillan Co.
2 *Ibid.*, p. 266.

The true scientist has been aptly described in the following terms[3]:

1. Sincere and open minded; not diverted by personal interests.
2. Alert and alive to truth, vital; not complacent.
3. Poised; not excitable, hysterical, or melancholic.
4. Discerning; not superficial.
5. Accurate; not indefinite.
6. Inventive and constructive; not lacking initiative.
7. Independent; not suggestible.
8. Thoughtful; not merely impulsive.
9. Industrious and energetic; not lazy or dilatory.
10. Executive; not haphazard.
11. Purposeful; not led merely by likes and dislikes.
12. Self-confident; not timid.

The professional point of view is likewise basic to the teacher's attitude toward his work. A high regard for the honest efforts of his associates and a desire to recognize the contributions of others characterize such a point of view. The professional teacher strives to think clearly, to act justly in his dealings with pupils and associates, and to improve himself by carefully evaluating his own experience and seeking to profit by the experiences of others. Also, he seeks opportunities to observe the work of other teachers and to avail himself of additional systematic instruction beyond his original professional training. Certain special features of the teacher's professional improvement are discussed in Chapter XVI.

Many specialized types of teaching require special professional attitudes for success. The teacher of an agricultural occupation, for example, must have gained, through his experience in the open country and by means of extended contacts with rural people, in their homes, at work, on their farms or in community life, a knowledge of their modes of

[3] Bulletin, Character Education Institution, Chevy Chase, Washington, D. C.

living, their traditions, and their difficulties. He must be fired with a zeal to make his professional contribution to the solution of the problems of rural people and to promote their welfare, to the end that an increasingly large number of self-respecting, self-reliant citizens may continue to delight in earning their livelihood from the soil. In the farm boy he must see an opportunity to render an individual and public service which challenges his utmost physical, mental, and moral efforts.

3. The teacher should grow in knowledge and skill.—No candidate for teaching may hope for success unless he is equipped with knowledge and skill, social abilities and ideals, appropriate to the particular group that he expects to teach. If the instructor would teach a farming occupation, he must know the appropriate subject matter and must be able to perform the manipulative operations of that occupation. Such qualifications are gained through practical experience, technical preparation, and professional training. It should be remembered that they come only by constant application to new problems and a constant evaluation of one's own experience in relation thereto. Opportunity for advancement lies in two directions: the discovery of new facts and principles that are involved in the vocation itself, and the improvement of the methods by which technical knowledge may be utilized in the vocation. In both of these directions, practical experience must be relied upon.

PROBLEMS OF THE TEACHER OF AGRICULTURE

The teacher of agriculture is confronted with specific situations which call for special preparation. In deciding to teach an agricultural occupation or to continue in such work at least two questions will occur to the thoughtful candidate or teacher:

1. What duties will I be expected to perform?
2. What are the opportunities which this field promises?

1. Teacher's responsibility.—An inventory of the duties that teachers of vocational agriculture are performing, in schools distributed through several states, reveals wide variation in activities. The following summary will suggest a brief analysis of these activities, based on observations of teachers at work and on conferences with groups of teachers.

Some Responsibilities of a Teacher of Vocational Agriculture

1. Making employment contacts by:
   - Writing application;
   - Having personal interview;
   - Negotiating and signing contract.

2. Perfecting a preliminary organization by:
   - Providing transportation facilities;
   - Driving or learning to drive a car;
   - Meeting former and new pupils and parents;
   - Visiting projects;
   - Taking survey of pupil resources;
   - Taking enterprise survey;
   - Meeting advisory board members;
   - Planning advisory board meetings;
   - Meeting maximum number of farmers in community;
   - Examining inventory of library and equipment;
   - Revising or preparing new inventories;
   - Preparing equipment and library orders;
   - Collecting materials from the field;
   - Planning field trips.

3. Making personal contacts by:
   - Joining local farm bureau and other farmers' organizations;
   - Affiliating with or joining civic, social, or fraternal organizations of one's choice;
   - Becoming associated with church of one's own choice;
   - Meeting business men and chambers of commerce;
   - Coöperating with county agricultural agents;
   - Securing right relations with superintendent and principal.

4. Preparing courses of study by:
   - Making preliminary surveys;
   - Reviewing former courses;
   - Studying individual interest and aptitudes of pupils;
   - Setting specific course aims;
   - Arranging course units to meet pupils' needs;
   - Providing suitable equipment and facilities;
   - Utilizing school plot facilities and the facilities of the pupils' home farms and other farms, for teaching;
   - Studying the practices of local farmers, dealers, freight agents.

5. Establishing professional relationships by:
   - Assisting principal and teachers in conducting school;
   - Determining specific responsibility in school organization;
   - Discharging these responsibilities cheerfully and accurately;
   - Affiliating with or joining local teachers' association;
   - Determining responsibilities to State supervisory officers;
   - Making necessary state and local reports on time;
   - Planning and conducting one's own professional improvement.

6. Conducting vocational instruction by:
   - Recruiting and teaching
     - a full-time group,
     - a part-time group,
     - an evening-class group,
     - a junior project group;
   - Utilizing appropriate methods of instruction;
   - Giving special attention to individual pupils' problems;
   - Planning and supervising practical work.

7. Assisting farmers with their problems by:
   - Advising with county agricultural agent and specialists as to tested methods;
   - Giving suggestions or services when requested;
   - Suggesting ways in which the department may assist farmers;
   - Coöperating with local demonstrations or tests;
   - Assisting in organization campaigns;

Making special studies of farm and market practices;
Providing school library of interest to farm people;
Organizing educational activities at farmers' meetings.

8. Promoting activities of the department by:
   Participating in vocational guidance program;
   Organizing and conducting junior project or club work;
   Keeping a public bulletin board;
   Taking photographs of pupils' activities;
   Preparing news items of local interest;
   Preparing slide talks for community use;
   Conducting school fairs and community exhibits;
   Assisting in local agricultural fairs;
   Preparing competition teams for local, county, or state contests;
   Becoming actively engaged in community activities, such as boy scouts, church, lodge, parent teachers' associations, civic clubs.

9. Keeping accurate records and accounts by:
   Filing in principal's office duplicate copies of
      courses of study,
      project statements,
      claims for credit,
      placement and follow-up records,
      library and equipment inventories,
      records of pupil surveys;
   Filing in the department copies of lesson plans and outlines,
      job analyses,
      enterprise surveys and summaries,
      farm management surveys,
      latest appropriate bulletin publications;
   Leaving the files and equipment in order for one's successor.

The experienced teacher will observe at once that many activities have been omitted from the foregoing list. Likewise, the list may appear to the inexperienced candidate, or to the young teacher, to be very formidable. It is intended only as a gross analysis of the usual responsibilities which

teachers are assuming. The judgment that experience furnishes the teacher will aid in establishing a proper balance between the important and the unimportant. The activities included in such a list will receive varying emphasis from the same teacher in different communities and from different teachers in the same community. Such variable factors as the community, the pupils, principals and superintendents, editors, county agents; or such influences as factional prejudices, agricultural depressions, and community programs affect the teacher's responsibilities in a given community at a given time.

2. Opportunities in agricultural education.—In the United States there have been established experimentation and research, resident collegiate courses in agriculture, systematic extension service, and a program of vocational education in agriculture of less than college grade. This latter program finds its place as an integral part of the public school system of the country and is considered a portion of the broad educational policy which provides for each an opportunity for training in keeping with individual aptitudes and interests. The acceptance of the challenge to participate as a teacher should be accompanied by a consideration of at least three basic factors, upon which success is in no small degree, contingent: (*a*) certain adjustments in agriculture and country living; (*b*) achievements in this field with implications of pertinent problems; and (*c*) opportunities for individual advancement.

(*a*) *Agricultural adjustments.*—To one familiar with the development of agricultural practices, it is quite clear that the following conditions tend to prevail: Farmers, except in areas of highly specialized production, are increasing the size of their farms. Increased capital and equipment are being required to operate these farms. Many areas that have been cleared are being abandoned, especially in the East. Many farms which are found to be marginal in their labor incomes are intermittently abandoned and worked. The ability o

the farmer to produce crops and livestock has made marked gains, as indicated in Fig. 1. Marketing conditions are becoming increasingly complex. Coöperative activity among farmers is making a demand upon them for a new type of ability, hitherto quite unnecessary. Many diseases and insect pests must be combated. Such conditions have created an environment for the modern farmer which is markedly different from the conditions that prevailed a generation ago.

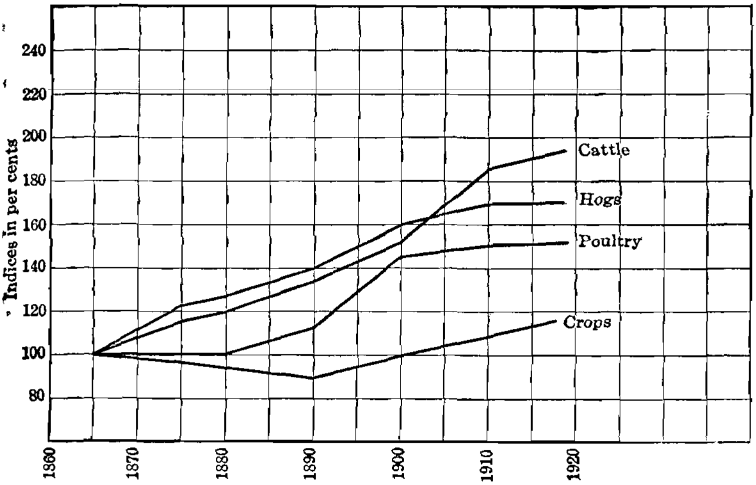

Fig. 1.—Increasing ability of farmers to produce crops and live stock by decades. Data from U. S. Census Reports.

There is evidence that the acquisition of necessary abilities on the part of workers in agriculture has not kept pace with the demands of the new conditions of progress. On the other hand, there is considerable evidence to indicate that the young man who hopes to succeed in farming must acquire many new abilities to meet the new demands. Some will possess sufficient native intelligence to gain by "pick-up" methods many of the required abilities. For most pupils, however, the quickest and the most efficient method of acquiring these abilities is that of systematic education.

The last quarter of our national existence has been marked

by increasing emphasis upon our industrial development. Labor-saving machinery has increased the production per man on farms, and has likewise provided opportunities for new forms of industrial work in towns and cities. As a result, there has been a continuous exodus from rural districts to centers of population. This tendency is expressed in the following table which shows the increasing rate of leaving farms by decades during the entire period of the nineteenth century for Livingston, Jefferson and Tioga counties, New York. In the case of men the percentages has increased from 6 to 56, while in the case of women the increase has been from 13 to 60.

Farming occupations have certain inherent characteristics, with which the teacher should be familiar. Among the more common, the following are to be noted: Farming furnishes continuous employment, provides an opportunity for good living, and affords an ideal home. When efficiently operated, a farm yields a reasonable income, combines the use of capital with that of labor, and provides healthful employment. The farmer works for himself rather than for an employer. Scarcely any other occupation affords such an excellent opportunity for father and son to work in partnership and for the young man to work gradually into a substantial business. Bailey,[4] by means of a questionnaire, studied the reasons why 155 college students who were reared on farms decided not to be farmers, and why 261 college students decided to follow an agricultural calling. In the first group, 40 per cent declared that the business offered no financial reward. Twenty per cent said that the physical labor was too exacting, with approximately an equal number indicating that no social opportunities were afforded. In the replies made by the second group, marked prominence was given to ideals and to the subordination of mere personal emolument and desire for money. Very few of the 261 students who planned to

[4] Bailey, L. H., Training Farmers, pp. 115–134. The Century Co., 1909.

be farmers mentioned the expectation of earning money as the leading consideration. Nearly every one of them gave higher ideals of living as the propelling motive. These ideals crystallized about two points—the love of nature and the desire for a free, independent life. "With these young men their business is to be an affair of the heart."

TABLE I

CHANGING RATE AT WHICH MEN AND WOMEN BROUGHT UP ON FARMS HAVE BEEN LEAVING THE FARM

(2069 men and 1580 women brought up on farms in Livingston, Jefferson, and Tioga Counties, New York)

Year of birth	Per cent of men *		Changing rate at which men have been leaving the farm † (per cent)	Per cent of women *		Changing rate at which women have been leaving the farm † (per cent)
	Farm operators and hired men	Occupations other than farming		Wives of farm operators and hired men, and on farms	Wives of men in occupations other than farming, and not on farms	
1890–1899	61	39	56	56	44	60
1880–1889	65	35	45	56	44	56
1870–1879	63	37	41	54	46	51
1860–1869	68	32	33	68	32	33
1850–1859	74	26	26	68	33	33
1840–1849	75	25	25	81	19	19
1830–1839	88	12	12	88	12	12
1800–1829	94	6	6	87	13	13
Total..	71	29	....	63	37	

* The percentage of men and women who are in occupations other than farming is the average of the percentages in the three regions studied.

† The changing rate of leaving the farm was calculated by correcting the percentage in occupations other than farming, for the age at which they left the farm.

Cornell Bul. 426, p. 39.

Such studies seem to show that low economic returns on the farm is a strong incentive to migrate to the city.

Preference for a life is the open country, however, constitutes a counteracting influence. The problem is further considered on page 75.

(*b*) *Achievements.*—There are at least three measures of the effectiveness of any program of vocational education: (1) the number of persons who continue in the vocation for which preparation has been received; (2) the extent to which the vocational curriculum tends to hold pupils in school; and (3) how well the vocational abilities of the pupils are improved, as evidenced by their increased earning power in vocation.

Two systematic studies, based upon the first method of measurement, are available. In 1921, Eaton studied the records of 332 graduates of 27 agricultural departments, and those of 578 persons who had been students in 48 agricultural departments but had not been graduated. His summary follows:

TABLE II

Records of Matriculants *

	Graduates		Non-graduates	
	Number	Per cent	Number	Per cent
In agriculture	150	45.2	241	41.8
In college	83	25.0	33	5.7
In other vocations	99	29.8	161	27.8
In other high school courses	....	....	143	24.7

* New York Rural School Survey, Vocational Education, p. 142.

Concerning the study, Eaton reports:

The percentage of boys in senior classes of all rural high schools is 36.5. Of all graduates of the years 1918-19 and 1919-20, 3.503 per cent went into agricultural occupations. Assuming that such were boys almost exclusively, it is evident that about 1 boy in 10 graduating from the high school goes into farming at graduation. The increased proportion from agricultural courses is thus from 300 per cent to 600 per cent.

It is not to be assumed, however, that the boy who seeks other employment of an unskilled nature for wages is lost to agriculture. The accumulation of a small capital is necessary to a start as a renter, and such may be made through employment other than as a farm worker. No data are available to indicate how far such a prognosis is reliable.

In 1922 Myers studied the effectiveness of vocational education in agriculture. The data are summarized in the following table:

TABLE III

RECORD OF FORMER STUDENTS OF VOCATIONAL AGRICULTURE IN SECONDARY SCHOOLS *

Factors	Left school with 1 or more year's instruction, 35 states	Left school with 3 or 4 years' instruction, 30 states	Number graduated, 6 states
Number of students	8,340	1307	2,076
Aggregate years studied vocational agriculture	14,471	4573	4,424
Aggregate years in high school	22,899	4646	7,809
Number graduated	4,206	1032	2,076
Scholarship, high	2,148	423	695
Scholarship, average	4,195	662	1,114
Scholarship, low	1,517	141	186
Number going to college	1,844	392	729
Number having worked at occupations other than farming	2,348	421	775
Number now farming, owner	428	61	72
Number now farming, manager	254	49	66
Number now farming, renter	326	41	59
Number now farming, partner	2,169	335	488
Number now farming, laborer	1,311	178	267
Aggregate number of months farmed	50,459	9021	11,086
Number of farm specialties reported	1,226	190	264
Success rating, high	1,612	333	472
Success rating, average	2,972	484	712
Success rating, low	569	49	87

* Bul. 82, "Effectiveness of Vocational Education in Agriculture," Federal Board for Vocational Education, May, 1923, pp. 55–59.

The following are significant conclusions which Myers draws from his study:

1. From 60 to 75 per cent of the students given vocational instruction in agriculture are now in agricultural work.
2. The vocational classes in agriculture in the States of New York and Pennsylvania are sending from ten to twenty times as large a proportion of their students directly into farming as do the academic high schools.
3. The mortality rate for students of vocational agriculture is only two-fifths as great as is the mortality rate for all high-school students.
4. Students who receive vocational instruction in agriculture are being given a partnership interest in the home farm, and this partnership status has increased rapidly since the passage of the Smith-Hughes Act. Of the students reported on farms in 1915, 29 per cent were classed as partners. In 1918 the percentage of partners had gone up to 45, and in 1920 and 1921 the percentage of partners was 51.

With regard to the holding power of agriculture, both studies reveal interesting data. Eaton concludes that courses in agriculture are 30 per cent more efficient than other courses in holding pupils in the third and fourth year of high-school work. Myers concludes that the mortality rate for students of vocational agriculture is only two-fifths as great as is the mortality rate for all high-school students.

The chief source of data available to the authors in evaluating the improved abilities of persons receiving instruction in vocational agriculture is a study made by Ladd in 1919, in which 50 farmers who kept cost accounts in coöperation with the New York State College of Agriculture were grouped according to the levels of agricultural instruction received—agricultural college, vocational agricultural schools, and no vocational training. The amount of capital invested was approximately the same in the three groups. The types of farming emphasized cash crops and livestock products as major enterprises. The labor incomes of the three groups, which contained approximately the same number of farmers, were regarded as partial measures of improved ability. For

that year, farmers who had received no agricultural training made an average income of $1100. Those who had received vocational training of less than college grade made an income of approximately $2000, while those who had received college training in agriculture made something over $3000.

Warren, in studying the relation of education to labor income of 573 farmers in Tompkins County, New York, records the following summary:

Education	Number of farmers	Labor income
Attended district school	398	$318
Attended high school	165	622
More than high school	10	847

Cornell Bul. 295, p. 552.

Since schooling is a selective process, it is not always safe to say how much of the increased labor income is due to vocational or other training; however, figures and data such as those given by Ladd and Warren carry strong implications that training has definite economic value.

These specific studies seem to indicate the trend in the achievements of persons possessing different amounts of training for agricultural occupations, as well as the influence of general and specific education on improved abilities. Much time will be required to collect data adequate to guide administrators and teachers in setting up effective instruction to meet individual needs. In this connection, placement and follow-up records and studies, such as those elaborated on page 51 should be made an integral part of the records of each agricultural school. The accumulation of such data from year to year, with a view to their evaluation in ten or twenty-year periods, is the only sound procedure.

(c) *Advancement.*—Vocational opportunities may be regarded from many points of view. One may wish to consider

opportunities for salary increases, with some indication of maximum amounts to be received; or one may desire to understand the relative chances for promotion on the various professional levels. Further, one who is choosing a vocation for the expression of certain ideals of service will evaluate opportunities in teaching vocational agriculture in terms of the contacts which he will be able to make with youth. Whatever the individual viewpoint may be, the assumption is made that in few types of teaching will one find such attractive initial salaries, yearly increments, and opportunities to guide youth, as are to be found in teaching vocational agriculture.

Experience thus far has demonstrated that school patrons and trustees are willing to pay for the specialized type of service that agricultural teachers are able to render. The more experienced teachers, and those who have demonstrated their ability to meet the exigencies of changing conditions by means of technical and professional improvement, have found excellent opportunities for advancement to larger departments or schools, to supervising principalships combined with agricultural teaching, to directorships of state or county schools, or to teacher-training positions. Some for personal and others for professional reasons have elected to accept allied positions, such as those of farm bureau agents, club agents, college teachers, inspectors, experiment-station assistants, and editors. Still others have entered directly into productive farming.

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In Chapter VIII the author deals with the number of teachers employed in the schools, the social significance of the teacher's work, his personal satisfactions, his preparation for his tasks, his general equipment, and his responsibilities.

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The volume is devoted to a discussion of present problems incident to education and vocation. Problems of vocations are considered from the standpoint of the individual, groups of individuals, and

economic society as a whole. The problems of education are considered from the standpoint of the basic principles of psychology in the laws of learning, principles of economics and sociology, and the principles and practices of sound school administration.

JAMES, WILLIAM, Talks to Teachers (Holt).

These talks relate to psychology and the teaching art. Special emphasis is given to a group of talks to students on some of life's ideals. This volume may well form the nucleus of every teacher's library.

LADD, G. T., The Teacher's Practical Philosophy (Funk and Wagnalls).

The author presents a treatise on education as a species of conduct. He deals with the function and equipment of the teacher, the chief ideals of the teacher, and the teacher's relation to society and to the state.

PALMER, G. H., The Ideal Teacher (Houghton Mifflin).

This thirty-page monograph contains many suggestions for a wholesome and professional point of view in teaching. Four ideals receive special treatment: the aptitude for vicariousness; already accumulated wealth; the power to invigorate life through learning; the readiness to be forgotten.

PALMER, G. H., Trades and Professions (Houghton Mifflin).

This brief monograph emphasizes three inducements which distinguish professional from commercial life: the opportunity to exercise our dominant powers; the chance to benefit somebody; the power of professional membership. In conclusion, the author indicates the nature and importance of a professional spirit. He suggests that teaching presents a type of professional spirit toward which all organized society moves.

SNEDDEN, DAVID, Vocational Education (Macmillan).

The volume is devoted to a discussion of current problems in vocational education. Special chapters are included dealing with the major fields of specialization in vocational training.

STIMSON, RUFUS, Vocational Agricultural Education (Macmillan).

The author deals with this subject primarily from the standpoint of instruction by home projects. Chapter VIII contains many helpful suggestions for agricultural instructors in the detailed conduct of their work. Chapter VII is devoted to suggestions to supervisors, superintendents, and directors in conducting a program of vocational education in agriculture.

WRIGHT, H. P., The Young Man in Teaching (Macmillan).

Among the major topics considered in the volume are: objections to the vocation, personal qualifications, educational preparation in various types of teaching.

CHAPTER II

DETERMINING AIMS AND FUNCTIONS OF AGRICULTURAL EDUCATION

One of the most important functions of the teacher is to *select* and *hold* clearly defined aims. Like the efficient traveler, he must know where he desires to go and how he expects to get there. If he fails either in formulating or in holding to the proper aims, much of his effort will be wasted. An aim is the end toward which effort is directed. In considering the aims of any department of education, it is helpful to evaluate the expressions of teachers themselves. The following is a selected list of statements of aims of agricultural education, secured from teachers of agriculture in seven states:

Teachers' Statement of Aims

1. To make good farm citizens.
2. To keep boys from leaving the farm.
3. To train boys to think by means of agriculture.
4. To enable farmers to make more money.
5. To assist boys to determine their occupations.
6. To train boys by means of practical work so that they may work with their hands as well as their minds.
7. To promote better farming practices.
8. To train boys to be efficient farmers.
9. To educate young men so that they may appreciate farm and rural life and so that they may be successful farmers.
10. To give pupils the skills and knowledge necessary to success in farming.

11. To teach the kind of farming practiced in this region.
12. To train boys and young men to be efficient farmers in this locality and to give them an appreciation of farm life and a knowledge of how to get along with neighbors and other people.

These statements show a wide diversity of opinion. The aims stated fall into several classes: No. 6 emphasizes the cultural value of agriculture; No. 5 is diagnostic or prevocational; No. 3, disciplinary; No. 2 places farm interest above the welfare of the boy; No. 1 lays stress on citizenship Nos. 4, 7, 8, 9 and 10 are generalized aims including the improvement of agriculture and the desire to help boys to become better farmers; and Nos. 11 and 12 are specific aims in terms of local farming practices. It will be clear to the careful observer that Nos. 1 to 10 are practically worthless when analyzed in terms of content of instruction.

At least four considerations are basic in setting up aims in agricultural education. These are as follows:

1. Aims must be specific.
2. Life activities embody aims.
3. Physical and economic factors further clarify aims.
4. Economic studies of farms assist in setting up aims.

1. Aims must be specific.—Of the aims given in the foregoing list, Nos. 11 and 12 are somewhat more appropriate than the rest, because the range of activity indicated by them is limited and because the teachers who stated them had in mind immediate and direct accomplishments. The more specific the statement of aim and the narrower the field encompassed by it, the greater is the likelihood of achieving it. A farmer desiring to add new blood to improve his herd by purchasing a mature cow has a much greater probability of success if he determines to buy a Holstein of a given age and breeding, with known milk records and requirements, than if he determines merely to purchase a cow. The key, then,

in the formulation of specific aims is to be found in the setting up of tangible goals for achievement. In vocational education the values must be direct and specific. A person's vocation is his method of earning a living, and the worker deals with specific activities. Undoubtedly there are some indirect and incidental values in vocational education. In terms of aim, however, these must take a secondary place. To train a pupil to meet the specific activities in a vocation requires specific aims.

2. Life activities embody aims.—In the choice of aims, the chief aid to the teacher is a systematic analysis of the activities in which people engage or may engage. In vocational education, the type of school determines the special group of people whose work is to be inventoried. In agricultural education, the key to aims is found in a study of what successful practicing farmers are doing, or of what the majority should be doing, as indicated by the practice of the more progressive farmers. Under this tenet, the generalized aims in the foregoing list will not suffice. When the work of individuals is inventoried, elements of specific time and place and of particular activities are introduced. We must consider farmers and farms in particular, and not *all* farmers and *all* farms. Such inventories are difficult to make. Progress can not be expected, however, until teachers equip themselves with the tools which the results of such studies provide.

According to the census, there were 667 vocations recorded in 1920. These are classified into nine groups as indicated in Table IV. The group of occupations included under manufacturing and industries ranks first, with agriculture a close second. Together, these vocations engage more than half the employed persons over ten years of age. The broad field of vocational education includes systematic training on the various levels of education for all types of occupations. Since vocational training has been included in the public-school program, its controlling purpose has been to "fit persons for gainful or useful employment" in one or more of

these occupations. This objective, it will appear, is so inclusive that it has little value in determining the specific aim for any group or for any individual occupation.

TABLE IV

PERSONS 10 YEARS OF AGE AND OVER ENGAGED IN GAINFUL OCCUPATIONS, DISTRIBUTED BY GENERAL DIVISIONS OF OCCUPATIONS, FOR THE UNITED STATES *

Division of occupations	Number	Per cent
Agriculture, forestry, and animal husbandry...	10,953,158	26.3
Extraction of minerals......................	1,090,223	2.6
Manufacturing and mechanical industries......	12,818,524	30.8
Transportation.............................	3,063,582	7.4
Trade.....................................	4,242,979	10.2
Public service (not otherwise classified)........	770,469	1.9
Professional service.........................	2,143,889	5.2
Domestic and personal service................	3,404,892	8.2
Clerical occupations........................	3,126,541	7.5

* Fourteenth Census, Vol. IV, p. 34.

Within the classification of agriculture, forestry, and animal husbandry, the census records eleven agricultural occupations. These involve the management and control of land and the production of agricultural commodities as practiced by the following classes of workers: dairy farmers, general farmers, turpentine farmers, stock raisers, florists, fruit growers, gardeners, nurserymen, apiarists, and poultry raisers. Another group of occupations includes foremen in the occupations just cited, while a third group includes laborers in these fields. Still a fourth group is found in a variety of related occupations, such as those of stock herders, drovers, stock feeders, corn shellers, hay balers, grain threshers, ditchers, ditch tenders, irrigators, and landscape gardeners. The distribution of these occupations as to number of persons engaged in each is shown in Table V. A care-

TABLE V

PERSONS 10 YEARS OF AGE AND OVER ENGAGED IN CLASSIFIED AGRICULTURAL OCCUPATIONS IN THE UNITED STATES *

Occupation	Number
Dairy farmers	118,813
General farmers	6,004,580
Turpentine farmers	309
Stock raisers	77,559
Dairy-farm laborers	63,367
Farm laborers (home farm)	1,850,119
Farm laborers (working out)	2,055,276
Farm laborers (turpentine farms)	16,099
Stock herders, drovers and feeders	56,766
Dairy-farm foremen	2,479
General-farm foremen	79,018
Farm foremen (turpentine farms)	724
Stock-farm foremen	4,894
Garden and greenhouse foremen	1,874
Orchard, nursery, etc., foremen	4,059
Florists	8,345
Fruit growers	55,402
Gardeners	98,591
Landscape gardeners	4,402
Nurserymen	2,659
Cranberry-bog laborers	241
Garden laborers	81,532
Greenhouse laborers	16,239
Orchard and nursery laborers	38,998
Apiarists	2,893
Corn shellers, hay balers, grain threshers	9,646
Ditchers (farm)	5,379
Irrigators and ditch tenders	2,600
Poultry raisers	14,116
Poultry-yard laborers	4,599
Other and not specified pursuits	1,366

* Fourteenth Census Vol. IV, p. 35.

ful survey on the part of any student of the problem in a given region would reveal many other occupations not listed.

Each specific occupation, then, constitutes a basis for formulating teaching aims. Training for dairy farming quite obviously involves different content and method from training for fruit growing or poultry raising. The teacher must study the life activities of persons engaged in a particular agricultural occupation in order to clarify his aims of instruction.

3. Physical and economic factors further clarify aims.— In the United States nearly 90 per cent of the cultivated area is utilized for growing five crops. In 1920, the area devoted to these crops, in millions of acres, was as follows: hay 96, corn 87, wheat 73, oats 37, and cotton 33. A study of the animal enterprises conducted and of the other crops grown on farms will indicate that most of the farming practices are grouped about one or more of these major crops. The crop and animal enterprises in different parts of the country are not conducted by chance, but rather in accord with the physical and economic factors. In the physical group are included such factors as topography, climate, soil, and the adaptations of plants to soil and climatic conditions; while in the economic group are found such influences as distance of the farms from large markets, labor supply, price of land, transportation rates and facilities, market demands.

The significance of those factors in determining aims resides in the principle that the type of farming practiced in any region will conform to the conditions which these factors impose. The chart[1] in Fig. 2 shows graphically the influence of these factors in the distribution of the major crops. The map on page 26 shows the general agricultural regions of the country, which have been determined by the interplay of these factors. Both the chart and the map show *variation* in agricultural practices and *regional distribution.* Because of these latter factors, the demands upon workers in the different types of farming vary, and specific aims must be set up to meet these varying demands. Fruit growing in the

[1] Prepared by the United States Department of Agriculture.

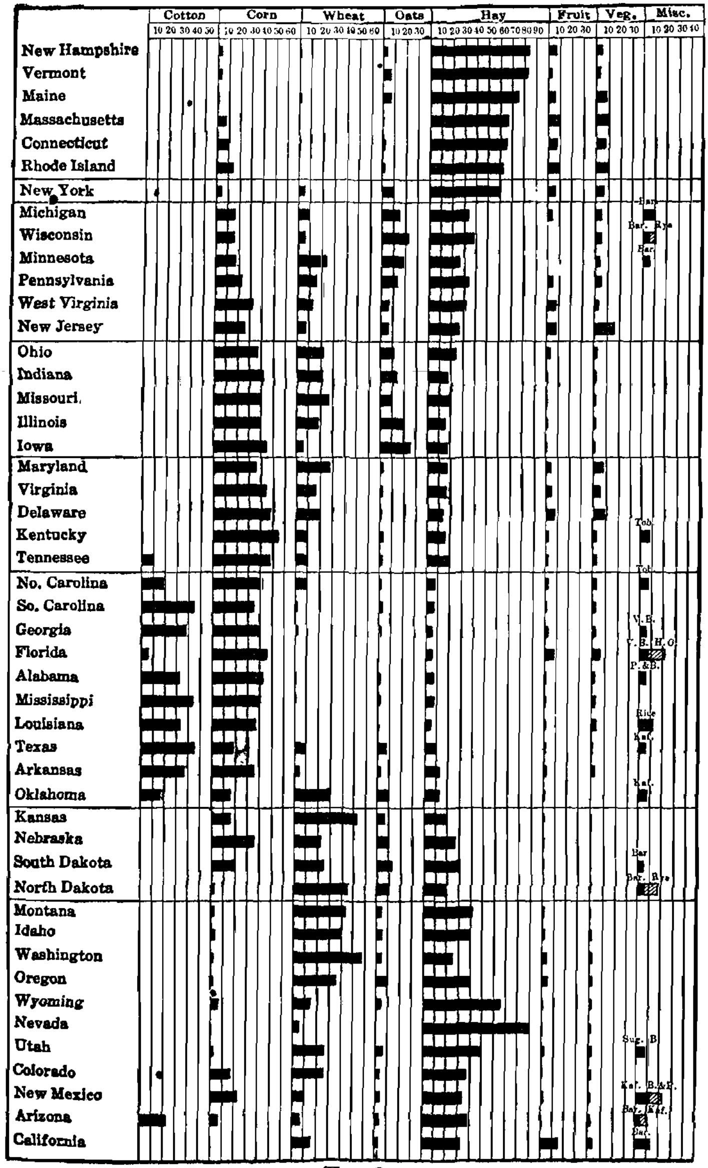
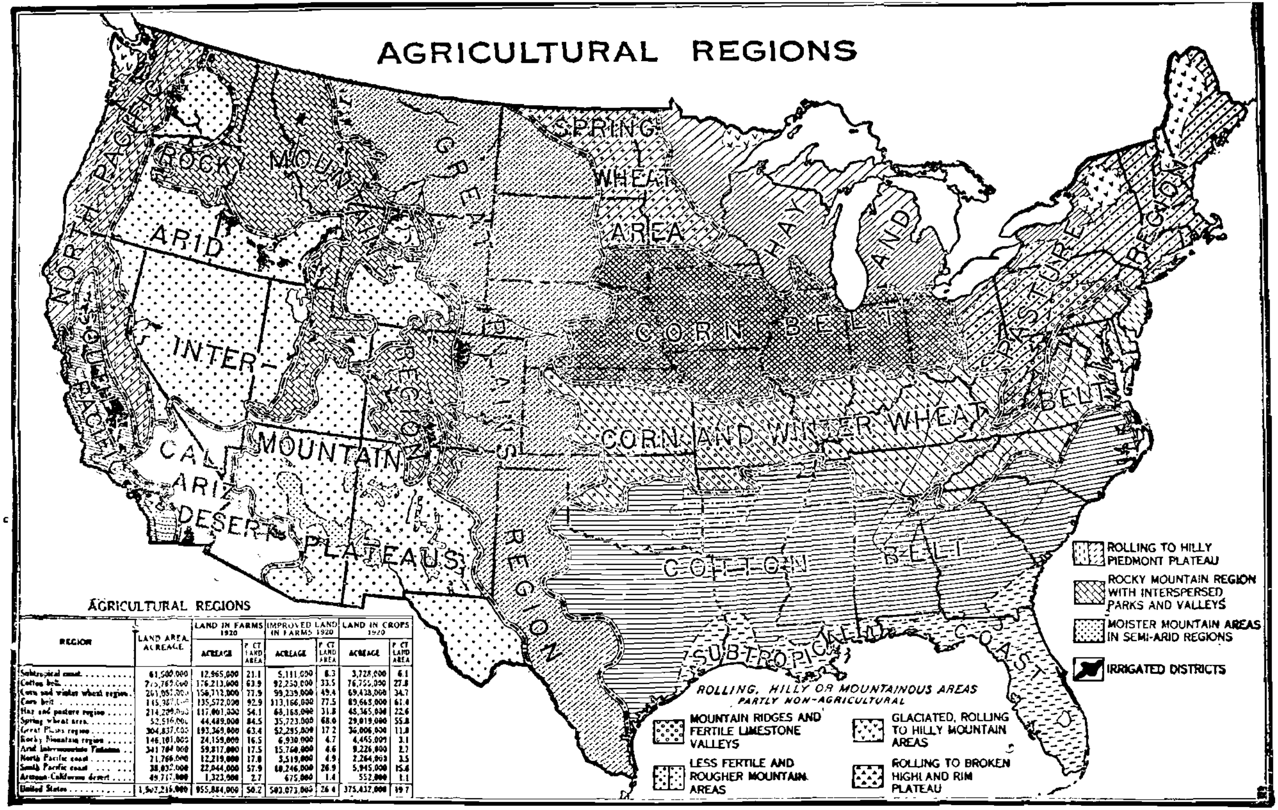

Cotton
Corn
Wheat
Oats
Hay
Fruit
Veg.
Misc.
New Hampshire
Vermont
Maine
Massachusetts
Connecticut
Rhode Island
New York
Michigan
Wisconsin
Minnesota
Pennsylvania
West Virginia
New Jersey
Ohio
Indiana
Missouri
Illinois
Iowa
Maryland
Virginia
Delaware
Kentucky
Tennessee
No. Carolina
So. Carolina
Georgia
Florida
Alabama
Mississippi
Louisiana
Texas
Arkansas
Oklahoma
Kansas
Nebraska
South Dakota
North Dakota
Montana
Idaho
Washington
Oregon
Wyoming
Nevada
Utah
Colorado
New Mexico
Arizona
California
Tob.
Tob.
Rice

FIG. 2.



AGRICULTURAL REGIONS

Region	Land area acreage	Land in farms 1920: Acreage	Land in farms 1920: P. ct. land area	Improved land in farms 1920: Acreage	Improved land in farms 1920: P. ct. land area	Land in crops 1920: Acreage	Land in crops 1920: P. ct. land area
Subtropical coast	61,500,000	12,965,000	21.1	5,111,000	8.3	3,728,000	6.1
Cotton belt	275,765,000	176,213,000	63.9	92,250,000	33.5	76,755,000	27.8
Corn and winter wheat region	201,057,000	156,712,000	77.9	99,239,000	49.4	69,438,000	34.7
Corn belt	145,987,000	135,572,000	92.9	113,166,000	77.5	89,665,000	61.4
Hay and pasture region	214,209,000	117,061,000	54.1	68,168,000	31.8	48,365,000	22.6
Spring wheat area	52,516,000	44,489,000	84.5	35,723,000	68.0	29,019,000	55.8
Great Plains region	304,837,000	193,369,000	63.4	52,295,000	17.2	36,006,000	11.8
Rocky Mountain region	146,101,000	24,159,000	16.5	6,930,000	4.7	4,465,000	3.1
Arid Intermountain Plateaus	341,704,000	59,817,000	17.5	15,760,000	4.6	9,226,000	2.7
North Pacific coast	71,766,000	12,219,000	17.0	3,519,000	4.9	2,264,000	3.5
South Pacific coast	38,032,000	22,044,000	57.9	10,246,000	26.9	5,945,000	15.6
Arizona-California desert	49,717,000	1,323,000	2.7	675,000	1.4	552,000	1.1
United States	1,903,216,000	955,884,000	50.2	503,073,000	26.4	375,432,000	19.7

FIG. 3.—Agricultural Regions of the United States.
[U. S. D. A. Yearbook, 1921]

San Joaquin Valley is not the same vocation as fruit growing in the lake belt in New York. Likewise, producing market milk in Wisconsin for the Chicago market is not the same vocation as producing market milk in northern Pennsylvania for the New York market. In each case, however, the two contrasted enterprises present certain common elements of aim which are derived from the influence of similar physical and economic factors.

There is frequently wide variation and distribution in farming types within a state. This is represented in Table VI which shows an analysis of the enterprises conducted by the farmers in the major agricultural regions of New York State. The counties are arranged so as to emphasize similar types of farming. The following summary will emphasize the significant contrast between two countries, Niagara and Delaware, which are selected because they represent wide variation in practice:

In Delaware County there are six times as many cows and twice as many acres in hay and forage as in Niagara County. In Niagara County the dominant enterprise is fruit growing, while dairy cattle are insignificant. For a school in Niagara County to attempt to train dairy farmers would be futile, since the teaching facilities and opportunities for supervised practice, and the opportunities to utilize the experiences of pupils in teaching would be lacking.

Frequently wide variations in types of farming are to be found within a county. Ulster County is a case in point. The eastern portion of the county lies in the Hudson Valley fruit belt while the western portion lies in a dairy and general farming area. No fruit is grown in the uplands of the western area while in the fruit region farmers actually buy milk for home use.

4. Economic studies of farms assist in setting up aims.— Warren suggests that if 40 per cent of the total farm income is derived from a single enterprise it should be considered sufficient to designate the type of farming in a given region.

TABLE VI

NUMBER OF DAIRY CATTLE AND POULTRY PER FARM, ACRES OF CEREAL, HAY AND FORAGE AND POTATOES PER FARM, PER CENT OF CROP AREA IN HAY, NUMBER OF FRUIT TREES PER FARM, AND AVERAGE NUMBER OF ACRES PER FARM IN NEW YORK STATE (1920 CENSUS)

County	Dairy cattle	Poultry	Cereals	Hay and forage	Potatoes	Per cent of crop area in hay	Fruit	Average acres per farm
Chautauqua	10.0	47.8	7.0	19.1	0.8	50	70.0	84
Erie	7.7	52.9	10.4	20.0	2.3	48	76.8	72
Niagara	4.5	62.2	15.6	18.0	0.9	28	770.0	71
Orleans	4.9	58.4	20.8	20.4	1.1	27	718.0	90
Monroe	4.6	56.5	18.8	15.5	3.0	24	434.8	70
Wayne	5.3	64.6	15.2	15.4	1.3	27	409.4	70
Oswego	9.5	44.5	5.8	21.4	2.0	61	84.1	84
Genesee	7.9	56.8	24.4	25.5	2.7	36	124.1	96
Wyoming	12.1	48.1	16.1	28.8	2.2	49	79.7	110
Yates	4.6	67.0	24.5	23.5	0.9	38	160.5	97
Livingston	8.8	57.2	24.8	30.7	2.6	40	86.6	122
Cayuga	8.1	70.7	22.1	28.6	1.4	44	78.1	92
Cattaraugus	15.1	43.4	8.1	28.1	0.9	68	43.8	122
Allegany	11.9	46.8	13.4	34.3	2.0	63	38.6	129
Steuben	8.9	47.7	16.7	35.1	3.1	58	44.3	124
Schuyler	5.6	61.9	18.7	30.0	1.1	52	106.3	107
Chemung	9.0	49.4	14.2	26.8	1.3	55	43.1	107
Seneca	5.4	63.2	27.8	31.5	0.9	44	179.5	101
Tompkins	8.3	60.4	16.2	28.9	1.1	54	61.5	100
Tioga	10.6	62.8	12.4	28.4	1.4	60	36.4	111
Broome	12.4	44.7	6.1	30.2	1.3	74	37.4	107
Cortland	16.5	52.2	7.4	39.6	1.7	78	33.9	122
Chenango	17.9	59.2	5.6	38.7	1.0	79	25.3	134
Madison	14.7	51.1	8.9	31.9	0.9	51	37.8	101
Onondaga	8.5	52.8	12.2	28.2	2.0	43	64.5	76
Oneida	18.3	42.5	5.4	29.5	1.1	69	29.5	98
Otsego	14.8	63.3	8.1	35.6	1.1	72	39.7	120
Delaware	24.3	51.5	4.5	36.7	0.8	82	41.3	162
Schoharie	13.2	60.0	14.2	36.7	1.0	62	73.2	124
Schenectady	6.8	54.0	16.0	37.0	1.0	62	66.0	104
Montgomery	14.5	59.0	17.0	48.0	0.9	64	41.5	113
Fulton	7.1	33.3	7.2	27.2	1.1	73	11.6	111
Herkimer	16.9	43.4	6.9	37.2	1.0	75	21.7	117
Hamilton	5.0	23.3	1.6	16.7	0.7	86	6.7	143
Lewis	17.0	31.7	9.3	36.0	0.9	73	5.7	148
Jefferson	17.2	41.3	17.1	46.9	0.5	66	10.5	135
St. Lawrence	18.2	35.9	8.3	38.7	0.6	75	11.8	137
Franklin	13.3	27.5	7.8	31.5	2.2	69	18.9	124
Clinton	12.6	29.1	9.1	34.4	2.2	69	46.1	131
Essex	8.4	31.5	6.5	30.5	1.8	75	46.5	157
Warren	4.9	30.0	2.9	17.6	1.0	74	31.1	137
Washington	13.3	49.3	13.0	37.2	2.8	62	34.5	130
Saratoga	6.9	49.6	10.6	27.5	1.3	62	49.0	106
Rensselaer	7.5	52.3	13.0	28.0	2.4	57	67.3	100
Albany	5.8	62.4	15.9	29.3	0.9	53	13.7	94
Columbia	8.0	66.5	20.0	35.0	0.9	48	38.8	132
Greene	9.5	55.0	10.4	30.0	0.8	58	280.1	126
Dutchess	13.2	77.0	12.2	34.1	1.1	57	196.4	140
Putnam	1.4	56.3	5.0	31.3	0.9	72	95.0	147
Ulster	6.7	73.7	7.9	16.2	0.9	44	247.6	95
Sullivan	9.2	68.5	4.5	20.0	0.8	70	48.8	117
Orange	19.2	80.2	6.6	30.8	0.9	63	143.3	98
Rockland	3.1	72.5	3.7	8.8	0.8	41	166.3	48
Westchester	7.1	100.0	4.6	14.6	0.9	53	37.7	68
Nassau	2.7	85.5	4.4	7.7	14.1	13	37.7	64
Suffolk	3.0	99.2	8.4	6.8	8.2	16	62.8	64

If no one source of income aggregates 40 per cent of the total, he suggests that the type be termed "general farming." Table VII, which is compiled from data in the 1900 Census,

TABLE VII

DISTRIBUTION OF FARMS BY CHIEF SOURCES OF INCOME *

Chief source of income	Number of farms	Per cent of all farms
Livestock	1,564,515	27
Hay and grain	1,319,854	23
Cotton	1,071,545	19
Dairy produce	357,544	6
Vegetables	155,788	3
Tobacco	106,250	2
Fruits	82,060	1
Sugar	7,174	0.1
Flowers and plants	6,159	0.1
Rice	5,217	0.1
Nursery products	2,029	0.04
Miscellaneous, no product equal to 40%	1,059,237	19
	5,737,372	

* U. S. Census, 1900, Part I, Vol V, p. iiii; Alaska and Hawaii omitted.

shows the distribution of farms by chief sources of income. About half of the farmers received at least 40 per cent of their incomes from livestock, hay, and grain. With the exception of the cotton farmers, about 90 per cent of the farmers in the United States secure their incomes from many sources. There are relatively few highly specialized farms, that is, farms on which attention is confined to one or two enterprises. Most farmers, however, plan to secure the major portion of their incomes from relatively few enterprises. It is quite apparent that the business of most farms is built around one or two enterprises, such as dairy cattle, and a cash crop in dairy farming, apples and pears in fruit farming, or a cash crop, market milk, and eggs in general farming. In the

studies referred to in Chapter VI it is important to recognize the significance of the enterprises from which the major sources of income are derived.

Studying the farm business as a unit, farm-management specialists have made thousands of records of the work of farmers. These studies have revealed certain basic principles of management and factors of efficiency, which provide the specialist and the farmer with an effective means of studying and improving the management of any particular business. Foremost among these factors are (1) size of business, (2) balance of business, and (3) production. The "labor income" is the ultimate economic measure of the effectiveness of the farmer's labor and management during any one year. The factors of size, balance, and production indicate the elements that make possible a good income, or explain why an income is low, quite apart from the individual ability of the farmer to operate a farm. These factors indicate situations in which unusual ability on the part of the farmer might or might not be expected to make profits. No matter what the farmer's ability might be, he would secure only limited returns if, for example, his farm were too small, his capital were too restricted, and his production were limited by poor soil and inferior stock. Only by adjusting the business so that these factors would be favorable to success could he hope to secure a labor income commensurate with his capacity and effort.

These studies have great significance for the teacher of agriculture, in connection with the establishment of aims. First, they constitute a means of determining the type of farming as a basic step in setting up course aims. (See page 106.) Second, they establish a gross measure of the ability to operate and manage a farm on certain "levels" of efficiency. Viewed from the economic standpoint, abilities in farming may be graded from the routine activities of the hired man to the complex activities of the owner and manager of a large farm business dealing with a number of enterprises and employing full-time and seasonal labor. The detailed

analysis of a farm business and the use of the factors of size, balance, and production serve to indicate the different levels of ability. Farm-management specialists seem to feel that the differences in success of farmers on the various levels are primarily differences in management practices. One farmer succeeds and another fails, not so much because of the superior operative or manipulative skill of the successful individual, but primarily because of his superior ability to coördinate and manage the various physical and economic factors at his command. For teachers, then, management abilities have chief significance on all levels that deal with the efficient management of labor and machinery and with the coördination of the various enterprises into an efficient business.

FUNCTIONS OF AGRICULTURAL EDUCATION

From the foregoing we may conclude that the aim of vocational education in a farming occupation is to train persons for efficient, profitable, and satisfying employment in a particular type or types of farming or in an occupation related to agriculture. If this aim is to be realized at least five *functions* must be performed to realize this aim. These functions may be characterized as (1) analytical, (2) selective, (3) participating, (4) integrating, and (5) synthetic. The necessity for the discharge of these functions arises in part from the characteristic differences among pupils, in part from the nature of the special capacities required in a vocation, and in part from the nature of the school organization and the home and vocational environments of pupils.

1. The analytical function.—In analyzing the capacities required in a farming occupation, the value of the experience of farmers is frequently underestimated. On the more progressive farms, business practices are usually in advance of contemporary scientific teaching. Successful farmers will select those practices and abide by those teachings that are

most profitable. The analytical function is generally performed, therefore, when the teacher determines the qualifications that make for success by studying successful practices and conferring with farmers, rather than by following tradition or accepting only findings of scientific investigators. Such studies will determine *what* tasks are performed and *what* decisions are made, and *how* the farm work is organized and conducted to secure maximum profits. Scientific principles will serve to explain *why* such practices pay best and *how* such experience may be transferred to other situations. The results of such analyses should stimulate teachers to study farms, crops, livestock, and markets, and to utilize the experiences of freight agents, milk dealers, elevator operators, commission men, and the like, with a view to analyzing the facts and ideas which are pertinent in training persons for proficiency in vocation.

2. The selective function.—This function emphasizes the necessity of selecting content, means, and materials to meet the individual needs of pupils. With the aptitudes, interests, ages, capacities, and experiences of pupils as one set of factors, and specific vocational capacities required as a second set, a teacher must make careful choice of content, materials, and methods which will enable him to achieve his instructional aims. Content for vocational education must be selected to suit the individual. Whatever may be the standards for selecting or eliminating pupils in other types of schools, it is strictly the province of the vocational school to adapt its training to the specific needs and capacities of its pupils, provided such pupils are motivated by a truly vocational purpose. One of the most valuable methods of exercising this function is to separate pupils into appropriate groups in which interests and capacities are somewhat similar.

3. The participating function.—There is no "impression without some form of expression," says James. To participate in the vocation that one is studying is a direct application of this truth. There can be no vocational training without voca-

tional participation. Recognition is accorded this principle in the Federal Vocational Education Act and in the enabling acts of most states, which have established rigid requirements for supervised practice. Providing for such practice constitutes a distinct responsibility of the teacher of agriculture. Suggestions regarding this responsibility are included in Chapter X. Attention is here directed to the significance of providing situations such that vocational pupils may participate in a round of experiences that shall truly represent the actual abilities required in the vocation.

4. The integrating function.—In a democratic society there is need of a commonness of purpose and desire in order that a unified government and appropriate community and home standards may be maintained. In the United States this end has been well served, up to the present time, by the free mingling of city and country populations. The farmer has assumed his position in civic affairs, and in recent years has taken his rightful part in directing the affairs of government. With the rapid development of industries and of urban centers, there is grave danger that the common purposes of urban and rural dwellers may be overlooked. Former Secretary of Agriculture Wallace emphasized this point clearly in the following statement, which is taken from one of his addresses:

> During the next twenty years, either consciously or unconsciously, the United States will adopt fairly definite policies as to industry and agriculture. We are approaching that period which comes in the life of every nation when we must determine whether we shall strive for a well-rounded, self-sustaining national life, in which there shall be a fair balance between industry and agriculture, or whether, as have so many nations in the past, we shall sacrifice our agriculture for the building of cities.

It is clearly the province of the vocational teacher to provide teaching situations that will enable him to teach correct attitudes and ideals with respect to wholesome rural and

urban living. The content for attitudes and ideals must go beyond the level which civics and history usually furnish in the public schools. If the integrating function is to find expression, the manifold activities of the farmer, as he deals with people in markets, in transportation, in politics, and in various organizations, must be emphasized from the point of view of selecting and teaching specific ideals of conduct. The farmer is but one member of a complex society. Essentially, his life is isolated, since he deals only indirectly with large groups of people. It is imperative that his point of view be clear and his standards economically and socially sound. He must know how to meet his economic problems by having a knowledge of his own rights and an insight into the methods and motives of those forces which would oppose him, if he is to maintain a place of respect and influence in the civic and economic affairs of the nation.

5. The synthetic function.—Detailed analyses and studies we must have in increasing number, but accompanying them there must be a conscious effort to integrate our teaching so that our pupils may be able to live a well-rounded life rather than a "pinched" one. In the language of Robinson, we must "humanize" knowledge.

The expression of this function is found in efforts to study the needs, capacities, and limitations of pupils and so to teach that they may leave the school with a right point of view toward life in the open country. They must appreciate both sides of the picture, its annoyances and its satisfactions. They must enter a farming occupation fully aware of what they may contribute to it and of what they may rightfully expect from it. They must be taught to discover their strength and weakness. Each pupil must be prepared to adjust himself to the perplexing problems of entering and continuing in a farming occupation.

"Farming is a means of making a living and a mode of life," says Davenport. In the past much emphasis has been placed on the "means" with far too little emphasis on the

"mode." To be able to produce crops and animals at a profit is an achievement, yet country life becomes an unbearable yoke if keen satisfaction, appreciation, and enjoyment do not accompany such labors. An enduring American agriculture can not be maintained unless opportunities are provided for those persons to earn their living from the land, who find in the open country their chance for self-expression, service and happiness. We must not endeavor to keep youth on the farms because we regard farmers as the backbone of the nation or because rural districts need a strong farming group. Rather, we must recognize the essential fact in a sound rural-life policy that our farms should be operated by persons who have made an intelligent choice of farming as a career and who have received practical and technical training for it.

GENERAL INFORMATION

Specialization of capacities.—Within a specific occupation there are many component capacities which the operator or manager must possess if his activities are to function in a useful, happy, and successful life. Thorndike[1] suggests that there are five fundamental capacities in human nature: (1) impression, the capacities for sensitivity of the different sense organs; (2) expression, the capacities for arousing movement of the different sense organs; (3) connection, the capacity to form habits; (4) selection, the capacity to maintain and strengthen one mental process in preference to another; and (5) analysis, the capacity to break up a fact into elements, to think of and react to parts and aspects. In life these turn into many varieties of special capacities, such as "the management of things, the management of men, the management of concrete ideas, the management of abstract ideas and symbols, self-control, energy, precision, thoroughness, originality, coöperation, leadership, self-denial, self-reliance, refinement, and sympathy." In the management of things are to be

[1] Thorndike, E. L., Principles of Teaching. The Macmillan Co.

included such activities as handling tools, repairing and operating engines, adjusting motors, culling poultry, and plowing fields. The management of men includes the establishment of wholesome, wise, and effective relations in dealing with others in all sorts of group life. The management of concrete and abstract ideas relates to the use of words, phrases, numbers, symbols, diagrams, pictures, and the like.

A gross inventory of the activities of practically all types of farmers will indicate that they deal with things, ideas, and people, as suggested by Thorndike. The ability to deal with things is important for the farmer because he must be able to operate all types of hand and power machinery and keep most of them in repair, to handle tools efficiently, and to handle crops, livestock, and poultry successfully. He must be able to deal with ideas in order to understand the scientific and business principles that underlie sound practice. These principles enable him to adapt his practices to changing conditions of weather, pests, soil, or markets. He also requires the ability to deal with men, as he must be able to employ and direct farm labor, negotiate effectively with merchants in purchasing or selling commodities, and take his place in all types of coöperative effort among farmers.

To these must be added the qualities of self-reliance, coöperation, and originality. The farmer must be self-reliant because he is both capitalist and laborer and because he must plan his work without the assistance of others. Likewise he must be able to coöperate, since the demands of the times and industrial competition have placed coöperative action well in the foreground. Furthermore, he must be resourceful and possess originality, since from time to time he must alter his plans and practices on short notice. He must be watchful of waste and quick to install labor-saving methods and machines.

There is an additional concept of life activities with which the teacher of agriculture should be familiar. Charters [2] suggests that, "all men strive to secure satisfaction through the

[2] Charters, W. W., Curriculum Construction. The Macmillan Co.

performance of activities under the control of their ideals. This is the great formal objective of life and as such determines the aim of education."

Principles are derived from concrete cases.—The principle expressed in the law of supply and demand was discovered after students of economics had observed, in hundreds of cases, that when the supply of a commodity was great and the demand slight the price declined and *vice versa*. The factors of balance, size, and production in efficient farm management were determined when thousands of farms had been studied and the facts of business efficiency analyzed. Again, the principles of pigmentation, color, and molt in culling poultry were determined by means of a study of many birds at different periods of production. Principles are expressions of truths therefore derived from many cases.

Principles are educational short-cuts. They serve only to hold together situations and experiences. They enable one to act and decide wisely when similar situations occur again. In practice we frequently cut so short that the pupil fails to make the connection between the principle and the situations from which it has been derived or in which it is to be applied. On account of this error in teaching general principles, there has arisen a need for the distinction between the *psychological* and the *logical* methods of presentation. In the psychological order, the content is presented with due regard to the pupils' capacities and mental characteristics, while in the logical order the content is presented in its organized form as formulated by the experienced scientist or investigator.

The psychological approach is most effective.—The following illustrations will make this point clear: the principles of ignition, internal combustion, and differential gearing could be taught best in connection with a Ford car or a tractor; the principle of balance, size, and production, in connection with specific studies of farms in the community; and the principle of the influence of nitrifying bacteria on soil fer-

tility, in connection with the growing of a crop of alfalfa, or with field studies of alfalfa practices. From the standpoint of the *logical* presentation, corn growing would be taught by considering the following, in about this order: botanical characteristic of corn; soil adaptations; distribution of the crop in the world, country, and state; fertilizer needs; varieties; types; cultural operations; the corn kernel; corn judging; and marketing. It is evident that little regard is had here for the daily problems of the farmer. Such a list merely represents the order in which these topics arrange themselves in the mind of a scientist. There is little connection between the principle and the farm operation from which that principle was derived and in which it is expected to function. When it is realized that a very small proportion of the adult population is able to make a direct application of an abstract principle, it is not surprising that when abstract principles are taught in the vocational school only meager results are obtained.

The psychological approach is shown graphically in Fig. 4, which represents some of the activities of the specialists in farm management in developing the principles of this science as they are understood at present.

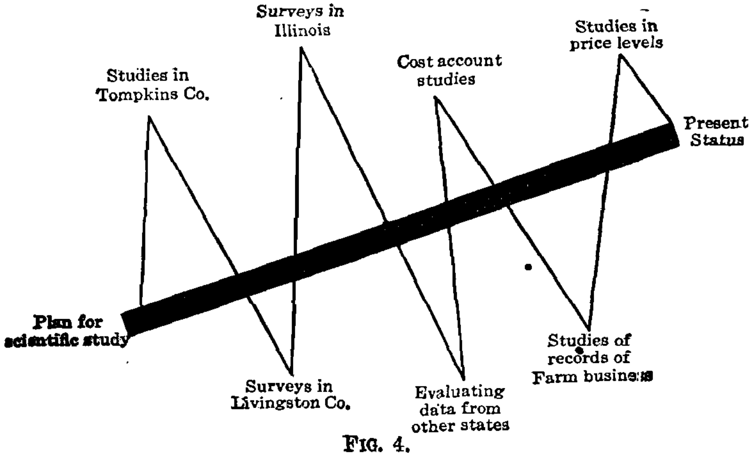


FIG. 4.

The light line represents the path over which the specialists traveled in securing facts and data from which to establish principles. The heavy line represents the band of facts, reasons, and principles which have emerged from such studies. The order that a scientist would naturally follow in considering the content of farm management is likely to be the most difficult order in which a pupil could take up the same subject matter. The logical order represents the results of systematic study and the viewpoint of one who has learned the process and principle. Furthermore, the psychological order takes account of the pupil's present experience and seeks to provide situations in which he can gain additional experience for himself.

Specific occupations provide the best general training.—Scientific agricultural research and a generation or more of experience gained by farmers have given rise to a mass of principles which have come to be regarded as almost universal in their application to farming practices throughout the country. In all fields of crop and animal production, mechanics, farm management, marketing and coöperation, investigators have sought to set up principles and criteria which will guide the farmer's practice in meeting his daily problems and difficulties. The well-ordered agricultural library is well stocked with books, bulletins, and reports in which are summarized scientific findings and suggestions for their use in practice. All this research work has made a signal contribution to agriculture. Without it, only mediocre progress would have been possible.

There is another factor that is significant. On page 70 it is pointed out that pupils differ widely in their vocational choices and that they frequently move to various parts of the country quite remote from the region in which they have been trained for a farm calling. With the uncertainty of pupils' remaining in the region in which they have been trained, and with the wealth of so-called principles of farming at the disposal of the teacher, the claim is frequently

made that the function of the teacher is so to train his pupils that they may enter any farm calling in any part of the country.

The falsity of such a claim should be apparent, however teachers and superintendents often fail to grasp it. It is therefore pointed out that such a claim would violate the generally accepted principles of educational psychology discussed above. The "principles" of farming have been derived from numerous specific cases and like all principles apply only to cases similar to those from which they are derived. If there prevail principles common to a wide variety of types of farming, they must be found in every type of farming considered. It follows, then, that the most effective training for farming in general, is in terms of a particular type of farming in which the elements common to many types prevail. It is well to remember in dealing with general principles that they gain their value only as they are derived from specific situations; and, therefore, whether or not the pupils who differ widely in vocational choices move from one type of area to another, the best way to discover the general principle lies in the direction of the specific farming types. This is due to the fact that the elements involved in the general principle are manifest in the particular situation. When the vocational aims provide for training in a specific farming vocation, opportunities are at once provided for teaching principles in terms of specific activities, which, from the standpoint of psychology, is sound teaching practice.

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CHAPTER III

ORGANIZING THE SCHOOL

Viewed broadly, education is experience, and the school is an institution in which the pupil is guided in gaining experience. The school is a means to an end. We have seen in the preceding chapter that one of the chief responsibilities of the teacher is to formulate and adhere to definite aims of instruction. In this chapter attention is focused on the problems incident to organizing the school in order that the purposes of instruction may be achieved. The effectiveness of a school organization tends to be directly proportional to the clearness of teaching aims and the adherence thereto.

Teachers' problems.—In organizing a high-school department of agriculture, the following problems are important:

1. Preparing an annual plan of work.
2. Preparing curricula and courses of study.
3. Preparing the teaching schedule.
4. Providing adequate teaching facilities.
5. Stimulating and supervising student organizations.
6. Appointing and using an advisory board.
7. Keeping and interpreting school records.

1. Preparing an annual plan of work.—The adage, "plan your work and work your plan," has special significance in the activities of the teacher of agriculture, because his work is more varied than that of most teachers in the school, and because it involves more contacts with people and greater need for surveys and field studies, and for collecting teaching material, organizing community activities, and recruiting

pupils. Most of these activities require a great deal of careful planning. The fact that a plan may be changed is not a valid excuse for having no plan. A plan that requires alteration is far better than no plan at all. It is a safe rule that unless a teacher can place his thoughts and plans on paper they are not sufficiently clear to be of much value in influencing his work from day to day. The following is the plan of work of a teacher who had been working in the same department for four years. The plan was made in June for the following school year.

Case 1.

1. Surveys (July, August and early September).
   a. Take about 40 additional enterprise surveys.
   b. Take survey records of pupils:
      those finishing rural schools this spring;
      new pupils moved into territory.
2. Revising courses of study and preparing new units:
      data from courses given during this year;
      survey data.
3. Collecting teaching material and locating points for field trips in farm management to be given the coming year.
4. Supervising practical work.
   a. Twenty-six vocational pupils.
   b. Thirty-one junior project pupils.
5. Community activities.
   a. Coöperating with county leader for junior project fair in September.
   b. Preparing exhibit for local agricultural fair September 12–16.
   c. Judging stock at fair.
   d. Planning grange program for year (August).
      (Teacher is lecturer of Grange.)
   e. Assisting in checking fertilizer tests on farm in coöperation with farm bureau. Assisting with field meeting.
   f. Answering extension calls.
6. Recruiting and enrolling pupils (July to December):
      full-time pupils;
      short-course pupils;
      junior project workers;
      evening-class pupils.

Apart from a statement of the details of the work which this teacher had already accomplished, his special school and community problems and his ultimate objectives, it is evident that he had reckoned with the future and had recorded, in outline form, a plan of action. The form of the plan and its method of organization are minor factors in the accomplishment of the major purposes of such an outline, namely, the preparation of a program of work which sets aims for accomplishment during a stated period.

2. Preparing curricula and courses of study.—Because of the limitations of space and the availability of suitable text and bulletin references dealing with the organization of the curriculum with agriculture as a major element, the reader is asked to consult the bibliography at the close of this chapter. A brief analysis of the content of the literature, as it bears directly upon the problem of introducing agriculture as a curriculum offering in the high school is included on pages 59-61. Because of the responsibility of the teacher of agriculture in preparing the courses of study in the various units of instruction, and because of the importance of this problem in the success of a school or department, this content has also been elaborated in a subsequent chapter (Chapter VI).

3. Preparing the teaching schedule.—The ideal schedule of classes is a flexible one. Such a schedule may frequently be administered so as to provide the freedom that is so greatly needed at certain seasons of the year. In the early days of agricultural instruction, three 45-minute periods and two 90-minute periods per week were allotted to this course in the teaching schedule. Monday, Wednesday, and Friday were devoted to recitations, and Tuesday and Thursday to laboratory and shop work. Arguing from the obvious ineffectiveness of this plan, some have advocated that a rigid half-day be set aside as the teaching schedule for agriculture and agricultural science. Williams[1] found that 30 states require a

[1] *Organization and Conduct of Vocational Agricultural Schools and Classes.* Williams, C. V., Kansas Printing Plant, Topeka, Kan.

90-minute period in the schedule for agriculture and that 18 states require a 180-minute period. All but 3 of the 18 states require that all the sciences be taught during the 180-minute period. From observation of the work of several hundred teachers and personal conferences with as many more, the writers feel that the best daily allotment of time to meet instructional needs is found in a schedule that allows some discretion on the part of the principal and teacher in setting the time for the accomplishment of special teaching tasks. Such situations as special seasonal activities, urgent project demands, long field trips, extensive demonstrations, and bad weather will come at once to the mind of the experienced teacher who resists being "held down" by a set schedule from which he may not deviate. In the fall and spring he may need a half-day or even an entire day, while on a rainy day 90 minutes is ample. When the entire half-day is provided in the schedule there is some evidence to show that teachers find difficulty in effectively utilizing the time of the pupils for this period.

To administer a flexible schedule is not easy. The closest coöperation and sympathy between the principal and teacher are required. With the adjustments of pupils to the varied curriculum offerings, the abilities of teachers to teach special subjects, and the pupil "failures," the principal finds that the making of a working schedule is a baffling problem. Being mindful of these difficulties, the authors offer two suggestions as a guide in making a flexible schedule. If a 90-minute schedule prevails and if a 4-year course is offered, the scheduling of classes might be as outlined in Fig. 5. Under this plan, during one half of each day, pupils would not be scheduled for any classes except agriculture. Thus, if it were desired to take a field trip or to leave school for the entire half-day, no classes would be missed by so doing.

Another suggestion for arranging a flexible schedule is to negotiate a reciprocal time allowance between agriculture and

other subjects in the curriculum. This plan is somewhat more difficult to operate because more persons are concerned, yet from the standpoint of effective teaching there is much to be gained by the individual assignment and reporting required. Under this plan there is agreement, between the principal and the entire high-school staff, to release vocational

PERIODS			
	1 First-year 2 agriculture 3 4	Third-year academic subjects	MORNING
	5 First-year 6 academic subjects 7	Third-year agriculture	AFTERNOON

ALTERNATE YEAR

PERIODS			
	1 Second-year 2 agriculture 3 4	Fourth-year academic subjects	MORNING
	5 Second-year 6 academic subjects 7	Fourth-year agriculture	AFTERNOON

FIG. 5.—Suggested arrangement of the schedule of classes.

pupils, when necessary for special field work. During the following day or days, an amount of time equivalent to that borrowed for field work is to be devoted to preparation of work missed on account of the trip. Such time is to be taken from the regular class period assigned to agriculture. The growing regard of school men for the significance of individual assignment and study commends this suggestion, since it corresponds to the ideals of this plan of instruction, which is commonly

characterized as the "maximum and minimum assignment plan."

A daily assignment of periods for agriculture is an essential part of high-school administration. For those who accept the half-day assignment, a flexible schedule already obtains. However, for those who use 90-minute periods and limit the content to vocational units, the suggestion of *flexibility* has proved itself a valuable aid to effective teaching. The time required for teaching can not be determined arbitrarily. The age, previous experience, and aptitudes of pupils, the content to be taught, and the availability and accessibility of teaching facilities are some of the factors which determine the time needed for instruction. Equipped with a knowledge of his pupils, an analysis of the content to be taught, and a plan regarding methods to be used in teaching, the instructor is in a position to determine well in advance how many double periods, half-days, or whole days will be needed.

4. Providing adequate teaching facilities.—Under teaching facilities are included such accessories as rooms, apparatus and equipment, tools, books, bulletins, furnishings, and land. Many suggestions have been made to guide local school officials in the selection of such facilities. The student should secure these publications from the department of public instruction in the state in which he plans to teach. In planning any year's work, the instructor's problem is to examine the facilities at his disposal and to determine what he will need in order to accomplish the teaching objectives that have been set up. The tendency in practice is to give much thought to the equipment and materials for use in school and far too little attention to the facilities in the community, on farms, in milk plants and packing houses. Because agricultural practices depend so much on scientific processes, and because sciences have been taught so extensively by means of laboratory experiments many teachers have fallen into the habit of leaning too heavily on the equipment provided at the school and pay-

ing too little attention to the teaching facilities found in the community.

The rooms to be used for agriculture are usually provided when the teacher arrives. His chief responsibility is to keep his rooms neat and in good order and to provide room accessories, such as charts, pictures, and appropriate exhibits. Each teacher is asked to recommend the equipment, tools, books, and materials needed by him for effective teaching, with the usual stipulation that he may not exceed a given sum. In the selection of these facilities the teacher must keep clearly in mind the teaching aims, and must check each request in terms of its adequacy as a means of accomplishing the aim.

5. Stimulating and supervising student organizations.— In Chapter IV the characteristics of adolescence and post-adolescence are discussed, and the statement is made that during this period supervised "group" or "club" activities play an important part in the normal development of the boy. Experience seems to verify this theory. The efforts of teachers to stimulate and supervise such groups as junior project clubs, young farmers' organizations, junior farm bureaus, and fathers' and sons' meetings have been richly rewarded. The "club" movement in junior and senior high schools also furnishes excellent testimony to the soundness of this attempt to direct the school and out-of-school activities of pupils. In thus guiding pupils, two key-factors are significant: (1) the common interests and motives of the pupils; and (2) a willingness to help pupils help themselves.

The first factor is easily attainable in a group of boys enrolled in an agricultural group, since most of them come from farms and all are pursuing a similar curriculum. In matters of coöperative buying and selling, promoting fellowship, or building for a strong community organization, there is common interest and motive. The factor of helping pupils to help themselves is less likely to prevail because of the tendency of teachers to do too much thinking and acting for

the boys. Like the mother teaching her infant to walk, the teacher must watch the boys in action, standing just close enough to catch them before they fall. The boys must actually plan the activities and conduct the work. They will learn to do by doing. There is no better way to teach the principles of coöperation and the art of dealing successfully with people than to guide boys in situations that are typical of those arising in the real life of farmers in the region.

6. Appointing and using an advisory board.—A group of three to seven practicing farmers, appointed by the board of education to assist in the work of the agricultural department, is a valuable school asset. From many years' experience in the community, such a group is well equipped to assist the teacher in recruiting pupils for the various types of courses, to aid in building courses through suggestions of occupation standards and jobs of greatest local significance, and to make visits of inspection for the purpose of advising and encouraging pupils in their practical work. Other activities of these men include giving talks or demonstrations at their farms or at the school, providing farms, equipment, and materials for study, and serving as "outposts" for the department. In the last-named capacity their assistance is especially valuable, since they are in a position to inform school patrons and farmers regarding the aims and functions of the department.

Considerable care should be exercised by teachers in recommending farmers for appointment as members of the advisory board by the board of education. Beware of the man who talks much and does little. "Be ye doers of the Word and not hearers only" is a pertinent dictum to be borne in mind in choosing advisory members. In addition to being practical men, they must be public-minded and somewhat devoted to the interests of farmers and the community. Fathers of the boys usually make good members. Bankers may frequently render excellent advice. The key-factor is that they shall represent the occupation through their experience.

7. Keeping and interpreting school records.—Record-keeping is a matter of routine, and is subject, of course, to the administrative policy of the school or the administrative unit or organization. Considered apart from the requirements set up in individual schools, and inventoried from the viewpoint of essential records, six types appear to be important:

1. Class book records:
    - Student lists;
    - Attendance;
    - Grades.
2. Curriculum and courses of study:
    - Copy filed in principal's office;
    - Cumulative records and notations.
3. Records of supervised practice:
    - Preliminary statement of proposed practical work;
        - Names of pupils,
        - Ages, subject classification,
        - Nature and scope of practical work,
            - Home projects,
            - Farm employment,
            - Skill checking;
    - Individual records of pupils' practice;
    - Final statement of supervised practice;
        - Names of pupils,
        - Type of practical work,
        - Records of labor (hours),
        - Financial records (cost factors),
        - Nature and proficiency in skills.
4. Community activities:
    - Personal visits made;
    - Publicity articles;
    - Demonstrations given.
5. Placement and follow-up records:
    - Records of school accomplishment of pupils;
    - Cumulative record of vocational activities;
    - Visits and special helps;
    - Additional courses pursued.
6. Diary of activities.

ORGANIZING PART-TIME AND EVENING-CLASS INSTRUCTION IN HIGH SCHOOLS

Part-time classes.—The primary purpose of part-time classes in agriculture is to provide instruction for the large group of boys and young men who are on farms and who may profit by systematic instruction in vocational agriculture and related subjects. During the growing season, from April to November, the demands of the occupation make it impossible for these persons to attend school. To meet their needs, therefore, the part-time school must be organized during the season when farm work is least pressing. This usually occurs during the winter months. Such matters as the dates for holding the class, the number of meetings per week, and the daily schedule necessarily must be determined by the needs and wishes of the group. To date, experience would seem to indicate that best results are achieved when the group meets regularly each day for five days each week for a period of four to six weeks.

In districts where the enrollment of part-time pupils is large, best results are obtained by the employment of extra teachers to assist the regular teacher of agriculture in conducting instruction. It frequently happens that practicing farmers and local mechanics have had sufficient technical training to entitle them to an authorizing certificate to teach. This training, when supplemented by itinerant professional preparation, often equips these men to render valuable service.

In the majority of schools, however, the part-time instruction will be given by the teacher of agriculture. His problems of organization will center about the preparation of a schedule of classes that will permit him to divide his time between the full-time and the part-time pupils. Such an arrangement is not difficult if suitable plans are made at the opening of school in September.

The organization of part-time class instruction must include

special provision for supervised practice adequate to make the instruction function on the farms of the pupils. The principles and practices that hold in the organization and conduct of supervised practice for full-time pupils are applicable to the part-time group. If members of the group enter school from real vocational motives, teachers should experience little difficulty in stimulating interest in the conduct of one or more farm enterprises or in the farm as a whole under improved conditions of organization and management. Likewise in the field of special courses in farm mechanics, pupils should find economic gain in the efficient use of machines and power under the guidance of the teacher. The record of achievement should be a natural outgrowth of the pupil's interests and aims, rather than the product of a rigid state system or a rigid adaptation of the records made by full-time pupils.

Evening-class instruction.—Evening schools for adult farmers are a part of a nation-wide movement to provide opportunities for education for persons of any age who may profit by it. The term "evening school" has come to mean any type of systematic instruction in agriculture that is designed for adult farmers, irrespective of the time the sessions are held.

The majority of the farmers in the United States have received training for their occupations chiefly by pick-up methods. Many have received valuable suggestions from the publications of the experiment stations and the colleges of agriculture, and many others have been aided by the extension services of the farm bureaus. The fact that nearly 15,000 adult farmers availed themselves of the opportunities for evening-class work offered in 1925 would indicate that these men have welcomed systematic instruction which deals with their special and technical problems. Under the guidance of a trained teacher of agriculture, they may be taught the fundamental principles which underlie success in their particular type of farming and in addition may be taught to

analyze their own technical and managerial problems and to utilize the scientific resources at their command. When adult groups are assembled for instruction for a series of years, the class meetings become round-table discussions in which the lifetime experiences of practicing farmers are brought to the front. This content, in the hands of a skillful teacher, represents the most valuable type of knowledge and the most valuable points of view that could be secured from any source. The conclusions from such conferences constitute the critical analysis of local situations and problems and may be used to formulate constructive business policies for future years.

The time and place of meetings and the number of sessions to be held depend upon the interests of the group. In organizing the class, an analysis of these interests is of vital importance. Because of the library and equipment facilities, the agricultural rooms are, without doubt, the most desirable place for the meetings of the group. Excellent courses, however, have been conducted in grange halls, in community centers, and in private homes, where these places have been more accessible to the group than the agricultural high school. Experience seems to indicate that it is much better to hold from two to four meetings per week than to attempt to hold sessions for one period a week for three months or more.

Special evening-class instructors may be employed to assist the regular teacher at special sessions or for the entire period. In many instances, an excellent organization has been provided by the coöperative efforts of a local teacher of agriculture, the local farm bureau agent, and the subject-matter specialist from the state college of agriculture. Whatever provisions are made for class instruction, it must be kept clearly in mind that systematic follow-up of farm practice is an essential part of effective teaching.

GENERAL INFORMATION

The suggestions in the foregoing pages have been intended to guide teachers in meeting organization problems in a high school. Supplementary to them are certain considerations which are fundamental in the administration of agricultural education in such schools. Likewise, there are certain basic tenets which appear to govern the organization of agricultural instruction in separate or special county, district, or state schools. In this section these considerations will be discussed under the following captions: (1) high-school departments of agriculture, and (2) special schools of agriculture.

High-School Departments of Agriculture

The place of vocational agriculture in the high school.—A high-school department of vocational agriculture is to be regarded as an integral part of the public-school organization. The principal of the high school is in charge of the department and the teacher of agriculture bears the same relation to him as does any other teacher on the staff. Instruction in vocational agriculture is a part of a nationwide movement to extend the high-school offerings to meet the educational needs of the pupils.

Under ideal conditions the work of a department of agriculture may be conducted most advantageously when a qualified teacher is employed to devote his entire time to the work. When the enrollment of pupils is not sufficient to warrant the employment of a teacher on the full-time plan several administrative devices have been proposed to make possible the conduct of instruction in agriculture in the smaller schools. Among these the employment of an instructor who teaches vocational agriculture and one or more classes in science, the employment of an instructor in agriculture to devote part-time to physical training, the employment of an

instructor to serve jointly as principal of the high school and teacher of agriculture and the employment of one instructor by two or more districts, seem to be most effective.

Difficulties in the agricultural curriculum.—To date, the inclusion of vocational agriculture as a part of the public-school program can be characterized as little more than a "patch" on the existing school organization. Essentially, what has happened is that foreign-language subjects have been withdrawn from the curriculum for vocational pupils and agricultural subjects inserted. The adherence to the traditional high-school organization and to the dominant aim of preparing persons for college has prevented, in many instances, the development of a curriculum in vocational agriculture designed to fit young men for farming occupations. The substitution of agricultural subjects for foreign languages represents the path of least resistance. Doubtless this condition will not be improved until school officials set up and adhere to aims for secondary education that include content other than that designed primarily for college preparation.

In many schools, principals and teachers have gained the broader conception of the work of a vocational department. Here honest efforts are being made to select content, in such subjects as history, English, science, and mathematics, that will function most effectively in the life activities of vocational pupils. It is at once apparent that close coöperation is needed between the academic teachers and the teacher of agriculture. If both groups of teachers possess a wholesome attitude toward the problem and an earnest desire to select appropriate and functioning content, much may be accomplished. An effective means of selecting such content may be found in analyzing the life activities of the pupils in terms of their vocational and civic need for content in science, mathematics, economics, history, and English. Some progress has already been made in this field. (See page 150 for illustration in short-course content.) Judging from the interest in this work displayed by principals and academic teachers,

it is reasonable to expect that continued improvement will be forthcoming. Conscious effort, however, must be focused on the problem from year to year, as courses of study are prepared. Very much the same procedure as that suggested in Chapter VI is recommended for selecting appropriate content for these courses.

The agricultural curriculum and college entrance.—Practically all land-grant colleges of agriculture admit the graduates of high-school agricultural departments to the courses leading to a degree. This is a wise provision, since such students come to the agricultural college with clearly defined professional objectives and with a background of experience which is valuable in their advanced technical training.

This provision for continuance on the various levels of one's chosen calling is quite in harmony with our American ideals and standards. The door of opportunity is open for those young men who desire to continue their training in agriculture. In many states a graduate of an agricultural curriculum is denied entrance to colleges of arts and sciences and to most professional colleges. This can not be regarded as a severe handicap, because in relatively few instances will the boy who is sufficiently interested in an agricultural curriculum to pursue it through a period of four years subsequently seek admission to a non-agricultural course. The principal and the teacher of agriculture have a responsibility at this point which is too frequently disregarded. As early as possible in the curriculum, the aims and abilities of individual pupils should be considered and carefully evaluated to the end that pupils may be guided in their curriculum choices. If, after one or two years of work in agriculture, a pupil discovers that he desires to enter an arts college, he should change his curriculum in order to meet entrance requirements. Beyond the second year of work in agriculture, it is difficult to change the curriculum and meet the college requirements. Frequently it may be necessary for a pupil to take a post-graduate year in high school to complete the requirements.

When analyzed in terms of a comprehensive professional preparation and career, this is not a severe handicap.

Special Schools of Agriculture

The place of the special school of agriculture.—In the organization of the two types of agricultural education, considerable disagreement has developed with respect to the advantages and the effectiveness of each type. The chief differences between the two types of organization reside in the curricula offered, the type of plant and equipment, and the number of vocational teachers. From the foregoing discussion it is clear that an agricultural curriculum in a high school represents but one of the many curricula offered. In a special school the curricula are limited to those intended to prepare pupils for specific vocations.

Each type of organization has advantages and disadvantages. Among the factors that commend a special school are the following: (1) the school may be somewhat more effectively administered because of the homogeneous grouping of pupils and the limited number of objectives to be accomplished in making the schedule, providing rooms and equipment, field trips, etc.; (2) an environment is provided in which all the pupils have motives centered on relatively common purposes; and (3) in the special school one finds a more highly trained and specialized staff and a somewhat higher degree of vocational interest and motive on the part of pupils. Among the disadvantages of the special school are (1) the expense of maintenance and operation, which gives a relatively high per capita cost, (2) a somewhat higher net cost to the student because he must leave home; and (3) the difficulty of organizing curricula to meet the specific training requirements of given types of farming. In a high-school department of agriculture the pupils come from an area in which the farming is limited to one or possibly two types. In a special school serving a wide patronage area, the problem of selecting content of a wide variety of farming types is an acute one.

Thus far, in this country, experience seems to point to the conclusion that there is a place in which each type of organization may render effective service to its patrons. At the outset of any educational experiment, failures and misguided efforts are to be expected. Some special schools and some high-school departments, because of improper location, mismanagement, poor internal organization, small enrollment, or other causes, have failed to function, and quite properly have been discontinued. Conversely, both types of organization, under competent state supervision and local administration coupled with other favorable organization factors, have returned a measure of service to their patrons that warrants their continuance as a part of the educational program. The *statement is ventured that one of the largest single factors* contributing to the criticism leveled at the special school is the intervention of political factors in its establishment and subsequent administration. Under proper guidance in organization and administration, with careful attention paid to the reduction of overhead costs to the end that per capita charges may be reduced to a minimum, with earnest effort on the part of directors and teachers to extend the services of the schools to meet the agricultural and educational needs of their patronage areas, and with a proper geographical distribution of the schools so that overlapping of territory and duplication of effort does not prevail, and with the recognition of the functions of a local high school department of agriculture, the expenditure of public funds for this type of organization would seem to be justified.

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distribution of pupils as to age and grade, characteristics of the pupil and student population on different educational levels. In discussing the teaching population attention is given to the numerical importance of teaching occupations, distribution of teachers as to different types of schools, characteristics of the different groups, measures and policies looking toward the improvement of the teaching population. The chapter closes with a consideration of the money cost of education and the sources of school funds, and the professional organization of teaching.

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CHAPTER IV

UNDERSTANDING THE VOCATIONAL PUPILS

The practices to be followed in any department of school work depend primarily on the nature and characteristics of the pupils to be taught. Effective instruction is conditioned by the teacher's knowledge of pupil personnel with which he must deal. In simple language, education is the production of desirable changes in pupils. If the specific aims of agricultural education have been set up as suggested in Chapter II, the teacher has a clear knowledge of the progress that the pupil should have made at the close of a definite period of instruction in the vocational program. Viewed broadly, education may be regarded as the process by which the pupil advances from where he *is* to where he *should be*. A knowledge of the nature and characteristics of vocational pupils is thus an essential element in accomplishing the aims which have been formulated. In this chapter we shall consider the nature and characteristics of pupils eligible for, or enrolled in, a vocational curriculum preparatory to entrance upon an agricultural occupation. Such factors as age-grade distribution, persistence in school, school and vocational experience, environmental conditions, ambitions, motives, and probable future activities are pertinent. Many allied factors, such as the movement of population to and from rural communities, the correlation between the occupations of father and son, the boys' reasons for leaving school, the tendency of boys to choose occupations in the fields with which they are most familiar, the influence of the size of the farm business on boys' leaving the farm, and the pupils' entrance upon and persistence in

the occupations for which they have been trained, are likewise significant to school directors, principals, and teachers.

In studying the nature and characteristics of vocational pupils, teachers have access to at least two sources of information: (1) studies made by teachers and investigators, and (2) data and information gained through first-hand contact with pupils and parents at their homes, at school, and at the usual places of meeting in the community. In this chapter we shall consider ten important facts bearing on the nature and characteristics of vocational school pupils. These are as follows:

1. Good teaching recognizes variation in pupils' natures.
2. Pupils vary in age and in school distribution.
3. Pupils' course and life motives vary.
4. Pupils are likely to choose occupations in a familiar field or the occupations of their fathers.
5. Economic factors influence pupils in choosing an agricultural occupation.
6. High-school enrollments are increasing.
7. The school is a selective agency.
8. Many farm boys are out of school.
9. Psychological traits of pupils have important implications.
10. Part-time pupils have special characteristics.

1. Good teaching recognizes variation in pupils' natures. —The existence of variation in all natural forms is a familiar fact. Frequently, however, the existence of variation in mental qualities, actions, and temperaments of human beings is overlooked. Psychology teaches that the recognition of individual differences among pupils is of the utmost importance for effective instruction.

If a thousand men are picked at random and arranged according to height, there will be a few very short ones at one end of the line and a few very tall ones at the other, while the majority will fall between these extremes and will exhibit less marked gradations in height. Such a condition exists with respect to variation in the abilities of pupils in

a given class. Contrary to the common belief, the members of a class can not be divided into two distinct groups, one consisting of dull pupils, and the other of bright ones. Rather, as in the case of the thousand men graded according to height, the majority will show slight differences, while a few at either extreme will show wide variation from the average.

A good teacher seeks to determine differences in pupils' abilities and to select means of training calculated to promote desirable changes. Such a statement would seem to be a mere platitude, but there are two very common and costly mistakes in teaching which give evidence that its significance is not appreciated. The first error resides in an attempt to crowd all pupils through the same course. A tendency prevails in many schools to set up a curriculum or a course and then seek to fit the pupil to it. If the mold provided is not adjusted to meet the individual differences of the pupils, injustices are certain to result. To correct this error, the organization within a school or department and the content and methods of instruction must be sufficiently flexible to permit these individual differences and aptitudes to be recognized in the teaching. Vocational courses must be so planned and conducted that the pupils receiving the instruction may possess, upon completing the work, the best possible equipment with which to engage in the vocation at that particular time. This demand upon the vocational school is a prime factor in making the cost of vocational education relatively high.

The second error is found in the tendency to think of the abilities of pupils in terms of the aptitudes, interests, and achievements which teachers themselves possess. For example, if a teacher is an expert mechanic he is likely to think that his pupils are stupid unless they are mechanically gifted; or, if a teacher can deal skillfully with words and phrases either in conversation or in writing, he is likely to be impatient with the pupil who has little aptitude in this direction. To counteract this error the teacher must seek to recognize

individual differences between pupils as a basis for his course organization and instructional content and methods.

In large classes, and especially in special schools, there is often such a wide variation in age and ability that teachers face an extremely difficult problem in adjusting instruction to all the members of the heterogeneous group. The problem is rendered more difficult by limitations of time and money. In such instances, it is clearly the province of the teacher to set up instruction that will aid the largest number of the pupils who will profit most by it.

In discussing individual differences, Thorndike[1] suggests that we may think profitably of adults as men of thought, men of feeling and men of action. The scientist would be typical of the first class; the poet artist, or musician, of the second; and the army officer or politician of the third. He further suggests that individual intellects may be divided roughly into two classes: those able to work with ideas—*idea thinkers;* and those able to work with things—*thing thinkers.* The *thoughtful teacher is anxious to provide for* pupils who have special aptitudes for action, feeling, or thought, and for the needs of the idea thinkers and of the thing thinkers. Particularly in vocational education, teachers must study constantly the natures of their pupils and be always ready to adjust their school and course organization and instructional content and method to suit individual needs. The expression "vocational education must become individual," so common in the literature of this subject, has its origin in the recognition of this point.

2. Pupils vary in age and in school distribution.—The Federal Vocational Education Act and the enabling acts of most states place the minimum age limit for vocational training at 14 years. Experience would seem to indicate that at the age of 14 many pupils do not have clearly defined occupational objectives.

[1] Thorndike, E. L, Principles of Teaching, p. 85.

In Table IX is given the age-grade distribution of boys enrolled in the high-school departments of agriculture (excluding cities) in New York State for 1925-26. In Table X

TABLE IX

DISTRIBUTION OF PUPILS BY AGE AND GRADE IN 73 HIGH-SCHOOL DEPARTMENTS IN NEW YORK, 1925–26

Age	I year	II year	III year	IV year	Special
–14	117	10	0	0	18
14	163	39	11	0	10
15	147	98	37	7	21
16	101	100	61	23	11
17	26	49	59	46	10
18	4	19	38	26	6
19	30	26	18	16	2
19 plus	1	2	0	8	2
Total...	559	325	224	126	80

TABLE X

AGE-GRADE DISTRIBUTION FOR SIX NEW YORK STATE SCHOOLS OF AGRICULTURE (1925–26)

Age groups	Freshmen	Juniors	Seniors	Specials
15	6	2		
16	22	5	1	1
17	25	17	8	5
18	20	18	15	5
19	16	30	19	1
Over 19	42	27	46	18

is given the age-grade distribution by percentages in several special state schools of agriculture. From these tables it will

be noted that high-school pupils enter upon an agricultural curriculum at an earlier age than the pupils in special schools. The fact that pupils in most high schools are asked to elect their curriculum at the beginning of the ninth grade is undoubtedly responsible for this condition.

In Table XI is given a summary of the distribution of pupils in high-school departments of agriculture (excluding cities) in New York State for 1925-26, together with the percentages of the total number of pupils found in each year of instruction. Two points emerge from a study of this

TABLE XI

DISTRIBUTION OF AGRICULTURAL PUPILS IN 73 NEW YORK HIGH SCHOOLS (1925–26)

	Number enrolled in each grade	Per cent enrolled in each grade
Freshmen......	569	45.7
Sophomores....	325	26.1
Juniors........	224	18.1
Seniors........	126	10.1
	1244	100.0

table. *First,* a very large proportion of the boys are found in the first two years of instruction. At the close of this period many pupils have either dropped out of school or have elected other curricula. In the majority of schools the former group exceeds the latter, by two to one. This means that the more important units of instruction must be offered during the first two years if the maximum number of pupils are to be trained. It will be clear that in many schools much effort is wasted in setting up courses that are not well attended. *Second,* there is considerable evidence to show that

many boys from 14 to 16 years of age enter upon an agricultural curriculum in the high school without having had prevocational contacts. To this group the first year of a vocational curriculum is essentially a "try-out" course. Some boys discover that they do not like or have no aptitude for such a curriculum and therefore discontinue it. The implications of this situation point clearly to the fact that a vocational curriculum is most effective when preceded by some type of prevocational instruction.

Table XII shows the farm experience possessed by boys

TABLE XII

FARM EXPERIENCE OF BOYS ENROLLED IN HIGH-SCHOOL AGRICULTURAL COURSES IN NEW YORK STATE, 1925–26

Experience	Number	Per cent
Always lived on a farm	988	60.0
5–10 years' farm experience	259	15.8
2–5 years' farm experience	85	5.2
1–2 years' farm experience	48	2.9
1–2–3 summers' farm experience	171	10.4
No farm experience	93	5.7
Total	1644	100.0

enrolled for the school year 1925-26 in the high-school departments in New York. From these data it will be observed that there is considerable variation in the farm experience possessed by the pupils who present themselves for instruction. In high schools, the fact that pupils have had farm experience is likely to mean that they have had experience in the types of farming dominant in the region. This is not the case, however, in the special schools. An analysis of the farm experience of boys in the entering classes of three state

schools shows that the boys entering each school have had experience in from five to seven types of farming.

Variations of similar nature, which may be ascertained in any individual school, indicate that it is important for the teacher to know where his pupils *now are* with respect to farm experience. The boy with a lifetime background of farm experience presents a much different problem from that of the boy reared in a village. Closely associated with the boy's farm experience at the time of entering the course is the problem of finding opportunities for him to gain additional experience during his progress through the curriculum. Boys who come from farms are living in an environment in which they may secure training in farm skills and management practices, while the village boy must seek similar opportunities on the farms of others.

3. Pupils' courses and life motives vary.—One measure of the appropriateness of vocational courses to the occupational interests and ambitions of pupils is the declaration of aims on the part of pupils themselves. Such expressions are occasionally misleading because of the present lack of prevocational training and of accurate knowledge on the part of pupils regarding vocational opportunities. Usually, the connotations of the words, "engineering" and "profession" are more attractive to pupils than those of "farming" and "clerking"; some declarations are colored by such influences as these. Furthermore, in some instances pupils' responses to questionnaires are merely guesses because the boys have not yet given serious thought to the choice of a vocation. Nevertheless, it is believed that pupils' declarations have some significance with regard to the suitability of courses, and two sets of data (Tables XIII and XIV) are therefore included as indications of the general expressions of pupils.

Fulmer,[2] in coöperation with the school superintendents in Nebraska, secured the vocational choices of 25,914 boys

[2] Vocational Education, Bul. 8, State Board for Vocational Education, Lincoln, Nebraska.

and girls in the high schools of that state. A summary of their declarations is shown in Table XIII. The wide distribu-

TABLE XIII

VOCATIONAL CHOICES OF 25,914 PUPILS IN NEBRASKA HIGH SCHOOLS *

Vocations	Boys	Girls	Per cent boys
Agriculture	2,210	61	20.37
Athletics, sports, etc.	129	106	1.18
Art	140	239	1.29
Auctioneer	19		
Aviator	90	1	
Army and Navy	23		
Business	1,382	816	12.73
Clerical	361	2,715	3.32
Communication	99	18	
Engineering	2,386	1	21.99
Government work	138	9	1.27
Homemakers	....	245	
Law enforcement	17	3	
Literary	88	96	
Professional	2,435	10,243	22.44
Science	105	18	
Social and religious service	22	155	
Stage or platform	51	189	
Railroads	168	....	1.54
Trades	952	114	8.77
Miscellaneous	34	36	
Totals	10,849	15,065	

* Nebraska State Board for Vocational Education, Bul. 8, p. 6.

tion and the dominance of agriculture, business, engineering, and the professions in the choices of boys are worthy of special note.

Eaton,[3] in studying the vocational decisions of 762 pupils

[3] Eaton, T. H., Rural School Survey, State of New York, Vol. VIII.

who were enrolled in agricultural curricula in New York, found the distribution of choices to be as indicated in Table XIV, which shows that 76.12 per cent of the pupils had

TABLE XIV

VOCATIONAL DECISIONS OF 762 PUPILS ENROLLED IN AGRICULTURAL CURRICULA *

Farming	497	Engineer	42
Poultry farming	24	Mechanic	35
Dairy farming	6	Electrician	17
Fruit growing	1	Carpenter	3
Cattle breeder	1	Architect	3
Bee keeper	4	Truck driver	4
Florist	1	Railway employer	7
Nurserymen	1	Draughtsman	1
Milk handler	2	Tailor	1
Veterinary	4	Undertaker	2
Forestry	13	Aviator	1
Teaching agriculture	26	Chemist	1
		Nurse	2
	580	Homemaker	1
		Y. M. C. A. secretary	1
		Detective	2
		Business	37
		Lawyer	8
		Physician	3
		Banker	3
		Musician	2
		Author	1
		Army officer	1
		Naval officer	3
		Professional athlete	1
			182

* New York Rural School Survey, Vol. VIII, p. 135.

decided to follow farming or a related agricultural occupation.

In this same study, Eaton also gathered data regarding the reasons given by pupils for choosing the agricultural course. These reasons are shown in Table XV. The variability

and indefiniteness of reasons are specially conspicuous. Aside from the reasons given by 25 pupils who "wanted to learn poultry keeping," 10 pupils who "wanted to know dairying,"

TABLE XV

PUPILS' REASONS FOR CHOICE OF COURSE *

Reasons	Number
Because I intend to be a farmer	151
Because I am interested in farming	145
Because I want to learn farming	156
Because I like agriculture	144
To prepare for agricultural college	58
Because what I learn will help on the farm now	50
Because what I learn I can use some time	49
Because it is more practical than other courses	36
Because I have always lived on a farm	32
Because I want to learn poultry keeping	25
Because my parents advised me to take it	22
Because I want to know dairying	10
Because I want help in fruit growing	3
Because there is money in farming	26
Because it helps me to manage my farm work	8
Because it will make me better fitted for farming	10
Because I like shop work	9
Because I like the project work	7
Because I like the country	11
Because it is the most advantageous course	11
Because I need some farm experience	22
To find out if I want to be a farmer	15
Because I am a cripple and I can only teach	1
Because it is required (intermediate school)	23
The only H. S. course I can take (Grade VIII)	5
Because I wanted to learn a trade	4
To get an education	6
To fill up spare time	7
To get the counts toward my diploma	64
Prefer it to foreign language	99

* N. Y. Rural School Survey, Vol. VIII, p. 141.

and 3 pupils who "wanted to help in fruit growing," the reasons are not confined to any particular kind of farming. That the desire to be "just a farmer" should be expressed in such a large number of cases has special significance for teachers in building courses of study (see page 104). Most of these boys have had some contact with farming practices, and therefore have some basis upon which to assign reasons for course choices. However, their experience, information, and reflection regarding such choices have not crystallized sufficiently to enable them to select a given type of farming or a specific agricultural occupation for which they desire preparation.

4. Pupils are likely to choose occupations in a familiar field or the occupations of their fathers.—The assumption is ventured that the force of circumstances incident to the occupation, the mere postponement of decision on the part of the boys, and the lack of competing opportunities in other fields cause boys to decide in favor of the occupations of their fathers. Burdge [4] found that there was a positive correlation between the occupational choices of boys and the occupations of their fathers. Eaton [5] also found a high degree of correlation between the occupations of fathers and the expressed choices of pupils, as indicated in Table XVI.

TABLE XVI

CORRELATION BETWEEN OCCUPATION OF PARENT AND OCCUPATION CHOSEN BY PUPIL

Occupation of parent		Occupation of pupil	
Agricultural	77.76	Agricultural	76.12
Non-agricultural	22.24	Non-agricultural	23.88

Another correlation is shown by the occupations chosen by 1227 male students at the academy at Belleville, New York,

[4] Burdge, H. G., Our Boys, Chapter XXIV.
[5] Eaton, T. H., Rural School Survey, New York, Vol. VIII.

during the period 1824-1920. This summary, as indicated in Table XVII shows that 52.65 per cent of farmers' sons chose a farming occupation.

TABLE XVII

OCCUPATIONS CHOSEN BY MALE STUDENTS OF BELLEVILLE ACADEMY, 1824–1920 *

Occupation	Occupations of fathers of students		Occupations of male students	
	Number	Per cent	Number	Per cent
Farming	3043	84.43	646	52.65
Public service	....	....	228	18.56
Professions	561	15.57	8	15.24
Commerce	....	....	122	9.94
Manufacturing	....	....	44	3.59
Total	3604	100	1227	100

* U. S. D. A. Bul. 984, p. 35.

Young,[6] in studying the movement of farm population, isolated data regarding the occupations of 2069 men brought up on the farms of Livingston, Jefferson, and Tioga Counties, New York. These data, presented in Table XVIII, show that 73 per cent of the boys who were born on farms in these counties in the decade 1900-1909 are now engaged as operators or hired men in the regions in which they were born. Since 1820, an average of 70 per cent of the sons brought up on farms of these counties were farming at the time the survey was taken (1923), or had followed an agricultural occupation.

[6] Young, E. C., The Movement of Farm Population, Cornell University, Bul. 426, March, 1924.

TABLE XVIII

OCCUPATIONS OF 2069 MEN BROUGHT UP ON FARMS OF LIVINGSTON, JEFFERSON AND TIOGA COUNTIES, N. Y., CLASSIFIED ACCORDING TO THE DECADE IN WHICH THEY WERE BORN *

	Farm operators and hired men		Occupations other than farming	
	Number	Per cent	Number	Per cent
1900–1909	160	73	17	27
1890–1899	298	61	128	39
1880–1889	272	65	154	35
1870–1879	231	63	132	37
1860–1869	228	68	101	32
1850–1859	147	74	53	26
1840–1849	62	75	17	25
1830–1839	32	88	4	12
1820–1829	31	94	2	6
Total	1461	70	608	30

* Cornell Exp. Sta. Bul. 426, p. 20.

5. Economic factors influence pupils in choosing an agricultural occupation.—In Table XIX are summarized the data gathered from a study of the migration of men and women from the community of Belleville, New York, by decades from 1830 to 1920. Of the total number of persons born in Belleville during this period of eighty years, 1623 persons, or 66.3 per cent, spent their lives, or are now living, in the community or in the county. This community, located in one of the better agricultural regions of New York, is typical of many such areas throughout the country. The community has always maintained an excellent "home spirit" and has been progressive in maintaining good schools, churches, and agricultural and homemaking organizations.

TABLE XIX

MIGRATION OF MEN AND WOMEN FROM THE COMMUNITY OF BELLEVILLE, N. Y., BY DECADES FROM 1830 TO 1920 *

	Community		County		New York		U. S.		Foreign		Total
	Men	Women	Men	Women	Men	Women	Men	Women	Men	Women	
1830-1840.....	48	12	50	2	11	1	15	4	0	0	143
1840-1850.....	27	13	15	0	8	2	14	5	0	0	84
1850-1860.....	79	43	35	11	20	15	32	23	1	2	261
1860-1870.....	107	76	89	32	27	19	62	40	2	1	455
1870-1880.....	91	81	44	29	26	33	44	49	1	0	398
1880-1890.....	50	51	31	29	30	22	38	19	1	1	272
1890-1900.....	79	75	30	31	31	39	23	18	3	2	331
1900-1910.....	51	35	27	19	34	23	17	15	0	0	221
1910-1920.....	109	96	16	10	20	14	5	7	0	3	280
Total.....	641	482	337	163	207	168	250	180	8	9	2445

* U. S. D. A. Bul. 984, p. 27.

The census shows that in 1820 the number of persons engaged in agriculture in the United States was 87 per cent of the total number of persons who were gainfully employed, and that in 1900 the percentage had fallen to 26. A potent factor in making possible this movement is the increased efficiency of farm methods. When wages are good in cities and when industries are expanding, there is an increased movement of persons from farms to cities. For example, during the period of industrial prosperity in 1917-20 the number of boys leaving the farms was several times the birth rate of the boys in the country. During this period agricultural colleges and schools experienced decreased enrollments. Data for a similar period after 1896 showed that for several years boys and young men were looking city-ward for work.

Young,[7] studying the movement of agricultural workers away from the farms, found that the following sequence generally prevails: the hired man leaves first; and the farmer's sons follow. Later, some crop fields are turned to pasture and some of the poorer pasture grows up to brush; then the owner leaves and rents the farm to a neighbor. Still later, no one rents the farm, but the neighbor uses the pasture or cuts the hay; and finally the farm grows up to woods or weeds.

Because of the amount of capital invested and the value of his experience, a farm operator, when once established, is not likely to leave farming for other occupations. The operator who gives up farming usually does so (1) when his children are ready for a better grade school or for the high school, or (2) when the farm is sold or turned over to his sons. Young shows, from data summarized in Table XX, the

TABLE XX

PREVIOUS OCCUPATIONS OF 747 LIVINGSTON CO., N. Y., FARM OPERATORS

(On some farms father and son were operators, thus accounting for 797 operators).*

Tenure of the operator

Previous occupations	Owner	Part owner	Tenant, cash	Tenant, share	Tenant, cash and share	Manager	Total
Owner, operator......	13	7	1	5	1	1	28
Tenant..............	138	66	39	65	19	4	331
Hired man...........	37	14	4	32	4	2	93
Worker on home farm.	91	37	21	39	6	1	195
Farm manager.......	2	......	......	1	......	......	3
Other than farming...	46	41	6	10	......	4	97
Total..........	327	155	71	152	30	12	747

* Cornell Exp. Sta. Bul. 426, p. 60.

[7] Cornell Bul. 426.

previous occupations of 797 Livingston County farmers classified as to tenure. Only 97 or 13 per cent were in occupations other than farming before they took their present occupations. Young reports that most persons who changed from other occupations to farming made the change before they became very deeply involved in any business. He reports further that many of the farm operators indicated as coming from other occupations, were men who had left the farm and returned to take over their father's farm after his death or disability, and that many of the hired men coming from other occupations were men who worked on the farm for nine months and in the city for three months. Thirty-one per cent of the owners were sons of the previous owners, and 39 per cent of the share tenants were sons of their landlords. Other relationships will be evident to the reader.

TABLE XXI

Relationship of Owner to Previous Owner, Tenant to Landlord, and Hired Man to Operator (697 Livingston Co. Farms)*

	Relationship of			
	Owner to previous owner (per cent)	Share tenant to landlord (per cent)	Cash tenant to landlord (per cent)	Hired man to operator (per cent)
Son	31	28	8	8
Other relationship	11	12	12	13
No relationship	58	60	80	79

* Cornell Exp. Sta. Bul. 426, p. 78.

The data shown in Table XXI, also prepared by Young, shows the relationship of owner to previous owner, tenant to landlord and hired man to operator on 697 Livingston county farms. Thirty-one per cent of the owners were sons of the

previous owner, 28 per cent of the share tenants were sons of the landlord, eight per cent of the cash tenants were sons of the landlord and eight per cent of the hired men were sons of the farm operator. Of 747 farm operators 209 were either sons of the previous owner or sons of the present landlord. Thus 28 per cent of the farms had passed or were passing from one generation to the next in the same family.

Young presents two additional sets of data which have special significance for the teacher of agriculture. He studied the business relationship between fathers and their sons working on the home farm and also the influence of the size of the farm on the boys' leaving the farm. In Table XXII is

TABLE XXII

STATUS OF 382 SONS EIGHTEEN YEARS OF AGE AND OVER WHO STAYED ON THEIR FATHERS' FARMS (LIVINGSTON CO. FARMS)*

Status of son	Age of son (years)							
	18 to 24		25 to 34		35 and over		All ages	
	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent
Receiving no definite wages	74	69	11	10	9	5	94	24
Receiving wages	13	12	16	15	8	5	37	9
Working with father as partner	10	9	27	26	5	3	52	13
Working the farm as tenant	11	10	31	30	17	10	59	15
Purchasing or inheriting the farm	.....	.....	20	19	130	77	150	39
Total	108	100	105	100	169	100	382	100

* Cornell Univ. 426, p. 77.

shown the status of 382 sons 18 years of age or over who stayed at home on their fathers' farms. Sixty-nine per cent of the 18-25-year-old-boys received no wages whatever. These data will have greater significance when studied in comparison with the facts shown in Table XXIII, which gives the relation of the size of the farm to boys' leaving the farm. It

TABLE XXIII

RELATION OF SIZE OF FARM TO BOYS LEAVING THE FARM
(674 FARMS, JEFFERSON CO., N. Y.) *

Acres farmed	Number of families	Per cent of sons		
		At home	On other farms	Not farmers
30 or less	25	21	33	46
31–50	29	52	22	26
51–100	171	75	8	17
101–150	187	78	10	12
151–200	136	72	10	18
Over 200	126	84	8	8

RELATION OF SIZE OF FARM TO BOYS LEAVING THE HOME FARM
(697 FARMS, LIVINGSTON CO., N. Y.)*

Acres farmed	Per cent of sons	
	At home	Not at home
50 or less	38	62
51–100	42	56
101–150	62	28
Over 150	68	32

* Cornell Univ. Bul. 426, p. 36.

will be evident that there is a high positive correlation between the size of the farm and the boys' tendency to stay on the farm. This factor is purely economic. It appears that if the farm is large enough to challenge the interest and to reward the efforts of the young man he is usually desirous of remaining. In most cases where boys up to 25 years of age are working without wages, it may be assumed that the farm business is not large enough to warrant such payment. Though few data are available, experience would seem to indicate that one of the best ways in which a young man can enter a farming occupation is to establish reasonable and proper relations with his father on the home farm.

During periods of economic depression in agriculture, the tendency of young men is to look to non-agricultural occupations for gainful employment. Parents and neighbors encourage them to seek such occupations. Since we all tend to evaluate the future in terms of present conditions, when "times" are bad one is likely to think that they will remain bad. The science of economics teaches very pointedly that this is *not* true. Studies of business cycles, price curves, fluctuating markets, and the movement of farm population all reveal the fact that the ups and downs of business occur in cycles. It is very likely that a young man who likes farming and desires to prepare for it can choose no better time for his preparation than a period of depression. By the time he is ready to farm and in full swing, the economic cycle will have shifted, to his advantage. Warren and Pearson[8] present these considerations in a clear manner.

6. High-school enrollments are increasing.—The data in Table XXIV show that the enrollment in high schools reporting to the United States Bureau of Education has increased about eight-fold in 32 years, when the difference in the per cent of high schools reporting is considered. Another indication of the interest in high-school attendance is shown in Mas-

[8] Warren, G. F., and Pearson, F. A., The Agricultural Situation. John Wiley & Sons, 1924.

sachusetts where, in 1921, high-school enrollment showed a growth of 16.5 per cent while the elementary-school enrollment increased only 2.1 per cent during the same period. In New York the high-school enrollment increased 83 per cent during the period 1915-25. Apparently this interest in high-school instruction, as measured by attendance, is due to at least three sets of conditions: (*a*) On the average, the high-school graduate gets the better job or is eligible to professional training from which the non-graduate is barred. (*b*) The tendency on the part of many high schools has been to broaden their curriculum offerings to meet the demands and interests of larger numbers of pupils. (*c*) Both parents and pupils, especially the former, seem to appreciate more generally the advantage of a high-school education. Parents also seem to possess increased ability to keep pupils in school. These factors are significant to teachers of agriculture, primarily because in-

TABLE XXIV

STATISTICS IN PUBLIC SECONDARY SCHOOLS, 1890–1924 (EXCLUDING ELEMENTARY GRADES OF JUNIOR HIGH SCHOOLS)

	1890	1900	1910	1920	1924
Schools reporting	2,526	6,005	10,213	14,326	14,827
Per cent reporting	60.8	75.2	85.2	87.3	87.5
Teachers	9,120	20,372	41,667	97,654*	133,395†
Students	202,963	519,251	915,061	1,857,155	2,538,381
Per cent of total population in public high schools	0.32	0.68	1.00	1.76	2.26
High-school graduates	21,882	61,737	111,363	230,902	362,236
Teachers to a school	3.6	3.4	4.1	6.8‡	9.0
Students to a school	80.4	86.5	89.6	139.5§	199.0
Students to a teacher	22.3	25.5	22.0	20.5	22.1

* Includes 1361 men and 5069 women teaching in junior high schools.
† Includes 3299 men and 11,697 women teaching in junior high schools.
‡ Includes teachers in elementary grades in junior high schools.
‡ Includes pupils in elementary grades in junior high schools.

U. S. Bureau of Education Bul. 1925, No. 40, p. 4.

creased enrollments in agricultural curricula have been due to the same essential causes as increased enrollments in high schools.

7. The school is a selective agency.—Whereas there is much to reward the efforts of school patrons and teachers in increased high-school attendance, much remains to be done in training pupils efficiently for a democracy. Many pupils who enter the grades never reach high school, and many who enter high school fall by the way before graduation. The graph in Fig. 6, which was prepared from data given in the 1920 Census, shows the distribution of pupils by age groups as to school attendance. Attention is directed especially to the relative size of the groups in and out of school between the ages of 14 and 20 years, since this is the age group with which vocational teachers are primarily concerned. The same point is graphically represented also in Fig. 5, prepared from data secured by Brigham [9] in studying the schooling of over 80,000 white men of the selective draft.

In Table XXV are presented the percentages in the high-school grades of those who entered the first grade of the four-year high schools in the United States, as appearing in the 1924 report of the Bureau of Education. About 30 per cent of the high-school pupils do not return for the second year; about 50 per cent do not return for the third year; and about 60 per cent do not return for the fourth year. The implications of these data will be considered later in connection with the setting up of appropriate organizations and the building of courses of study. Many studies have been made of the elimination of pupils from school. From these, and from a knowledge of the mental traits of pupils, it is easy to conclude that the economic factor is of chief significance. The natural unwillingness of most persons to forego a present and lesser good, or to make a present sacrifice, for the sake of an increased benefit later on in life, is es-

[9] Brigham, C. C., Study of American Intelligence, Princeton Univ. Press, 1923.

pecially pronounced in those of school age. Pupils, and in many instances parents, are unable to recognize the benefits

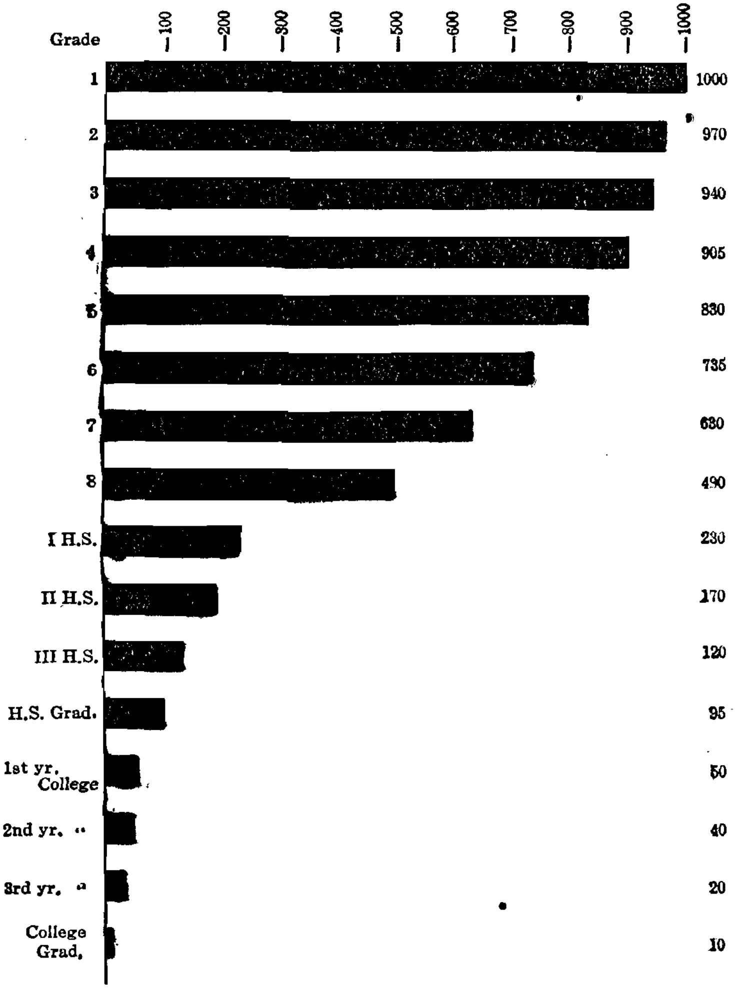

FIG. 5.

of education when measured by the necessity of a present sacrifice. Pupils who earn money usually enjoy many

privileges of which they would otherwise be deprived. This is one of the most potent elements in the pupils' decisions to

TABLE XXV

Distribution of Pupils in Various Grades of Public High Schools, 1907–1922*

(Pupils in elementary grades of junior high schools excluded.)

	First year	Second year	Third year	Fourth year
1907	100			
1908	100	72.2		
1909	100	67.9	51.8	
1910	100	68.1	49.0	38.5
1911	100	67.1	48.6	36.9
1912	100	71.0	51.3	39.4
1913	100	66.3	50.2	39.0
1914	100	70.1	49.2	40.1
1915	100	71.4	52.8	40.3
1916	100	72.1	54.1	44.3
1917	100	70.6	53.2	44.8
1918	100	71.0	52.4	44.0
1919	100	63.4	52.7	42.4
1920	....	71.4	46.7	42.0
1921	100	74.5	55.3	39.6
1922	....	....	....	46.6

* U. S. Bureau of Ed. Bul. 1924, No. 7, p. 3.

leave. The data given in Table XXVI show the reasons given by 14,930 employed farm boys in New York for leaving school. Of the total number leaving, 68.7 per cent left because they wanted to work and not because they had to work; 18.7 per cent left for financial reasons. Those in the latter group are typical of many boys whose help is needed at home or whose parents are unable to keep them in school longer. The fact that the boys did not like school apparently did not play an important part in their decisions.

TABLE XXVI

REASONS GIVEN BY 16–18-YEAR-OLD EMPLOYED FARM AND VILLAGE BOYS FOR LEAVING SCHOOL *

	Farm boys	Village boys
Wanted to work	68.7	72.1
Financial	18.7	10.1
Graduated	2.9	4.1
Disliked school	5.9	10.7
Miscellaneous	0.4	0.5
Sick	3.4	2.4

* Burdge, H. G., Our Boys, p. 115.

8. **Many farm boys are out of school.**—The everyday happenings of life rarely attract attention, while the unusual incident is certain to draw our notice. It is the usual thing to see pupils in school, and when they are assembled they impress one with their numbers. When pupils leave school, however, they mingle with adults and are not especially noticed. This tendency has led many persons to believe that a large number of our boys and girls up to 18 years of age

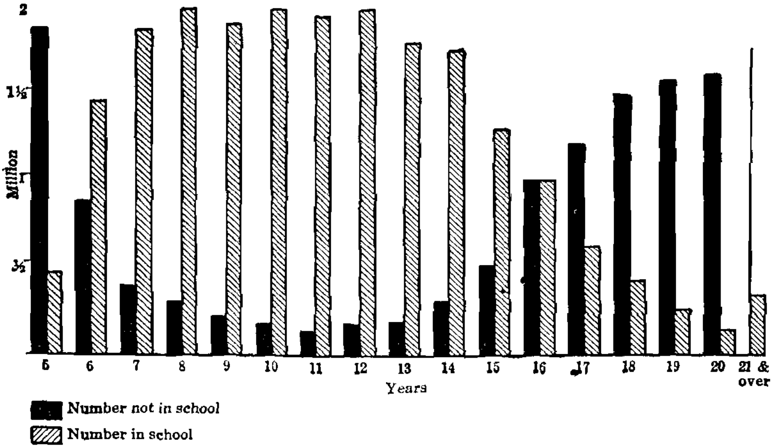

FIG. 6.

are in school. From Fig. 6 it is clear that a large number of young people from 14 to 20 years of age are out of school. For the most part, those out of school are at work. In meeting the vocational educational needs of pupils, it is imperative that teachers have accurate knowledge regarding the ratio of boys in school to those out, and the exact number and location of the members of both groups in a school patronage area. The 1920 census figures, supplemented by data from a summary made by the Department of Education in New York, showed the following distribution of male farm population for that state:

Total farm population	800,747
Male farm population	423,511
Male farm population (14–21 years)	41,625
Farm boys, 14–21 years, in high school	11,767
Farm boys, 14–21 years, in grades	6,928
Farm boys, 14–21 years, out of school	22,930

There were nearly 4000 more farm boys out of school than in school. The significance of these facts in building a program in vocational education in agricultural occupations can not be overemphasized at this point. The needs of boys in school have been met, thus far, more effectively than the needs of boys out of school. The 1925 Report of the Federal Board for Vocational Education shows that 63,558 male pupils were enrolled in all-day classes and that only 2072 male pupils were enrolled in part-time classes in agriculture.

9. Psychological traits of pupils have important implications.—Because the nature of pupils is so frequently conditioned by the mental traits that are dominant at the time of their entrance into the vocational classes, it is imperative that teachers understand these characteristics and their effect on pupils' conduct. The adolescent, or "growing up," period presents many factors which are of great importance in education.

To deal successfully with the problems of adolescence, one must have great tact, skill, and patience. Because of the

age at which adolescence occurs and the age-grade distribution of pupils, such problems are primarily those of teachers in junior high schools. For the most part, the boys who enroll for vocational courses are passing out of the pubertal period or have already passed beyond it.

About the ninth or tenth grade, the traits of awkwardness, bashfulness, clumsiness, and self-consciousness, which are characteristic of the adolescent, are beginning to disappear. In their stead are expressions of self-assertion, tendencies to "know-it-all," and a general resentment of arbitrary rulings or attempts to curtail freedom of thought and action. Probably the most important traits at this period relate to the desire for freedom. Here rather marked interests and preferences for vocation and new expressions of self appear. Likewise, the desire for tangible results and a keen sense of appreciation of accomplishment are strikingly in evidence.[10]

Such characteristics have important implications for the teacher, both in selecting and organizing the content of instruction, and in making wholesome contacts with pupils in and out of school, *on the athletic field, and at their homes.* The teacher of agriculture is accorded unusual opportunities for working with his boys, because he has a relatively homogeneous group and because he is thrown into such intimate contact with them at their homes as he supervises their practical work and studies their home problems. At this period, teachers of mathematics, science, and English attain best results by providing experiences for pupils in which specific and tangible tasks are set up and concrete results secured. Here again, the door of opportunity is flung wide open to the agricultural teacher because he deals constantly with life problems of pupils. His pupils are afforded ideal objectives for accomplishment, together with tangible returns in money or improved farm practice.

[10] The reader is referred to "Psychology of the Junior High School Pupil," by Peckstein and McGregor, Houghton *Mifflin Co., for further* study of the characteristics of adolescents.

In the field of social activities, boys need careful guidance. The setting up of strong social sanctions of conduct, which are under the control of the school or some other agency in the community, is a tested method of providing this guidance. Boys must be given an opportunity for self-expression and self-directed social activity if they are to get the true satisfactions which are so desirable. The wise teacher stands by and so guides his pupils that the activities are planned and executed by them; he merely advises them and stands ready to catch them, if necessary, just before they fail. Such activities as fathers' and sons' organizations and banquets, junior farm bureaus, young farmers' clubs, and radio clubs, offer excellent channels for guidance and instruction.

Throughout this period, the school and home, working together, will accomplish the best results. As a boy approaches graduation, the advice and counsel of parents play an increasingly important part in his life. The boy has passed beyond the "know-it-all" stage and has become more willing to listen to father and mother. Furthermore, at this time he enters another school or college or takes up an occupation. In either case he must rely greatly on the assistance and advice of parents. Most parents are solicitous for the welfare and training of their boys and respond enthusiastically to the earnest efforts of teachers. Occasionally one encounters the "erratic" parent who is unduly critical and who expresses himself freely. The true teacher, in accepting the challenge for altruistic service, will keep the boy uppermost in his mind and work for his best interest even under criticism.

10. Part-time pupils have special characteristics.—In addition to the traits just described, pupils constituting short-term or part-time groups possess special characteristics which the teacher must consider in planning courses to meet their needs. As indicated in Table XXVI, most of these boys have left school because of their desire to work. Burdge also shows, as a result of his study, that a large percentage of the 14,930

boys must enter vocational life with a very meager general education. His summary is shown in Table XXVII.

TABLE XXVII

PERCENTAGE OF 16–18-YEAR-OLD EMPLOYED FARM BOYS WHO HAD DROPPED OUT OF SCHOOL BY THE END OF EACH GRADE *

Grade	Per cent
4 or under	3.2
5	10.7
6	29.0
7	58.5
8	87.6
1st H.S.	94.4
2nd H.S.	98.1
3rd H.S.	99.3
4th H.S.	100

* Burdge, H. G., Our Boys, p. 88.

For the most part, the pupils eligible for part-time instruction have gotten out of step with school methods. Because of the inability of the teacher in the rural school to meet their educational needs, and oftentimes because they were older than the other pupils, they have felt out of place in school and have developed a mental set against school work and school methods. Most of them are *thing*-minded. Few, if any, of them have established good habits of study. Frequently their vocational aims are not well defined. A desire to earn money seems to dominate their vocational choices. One of their chief needs is guidance in becoming adjusted in an occupation. Some may desire to leave farming altogether.

Regarding the decision of some pupils in this latter group, it should be borne in mind that there are undoubtedly some boys and young men who possess neither the aptitude nor the ability to operate and manage a farm successfully. An attempt has already been made to show that the managerial

phases of most farming occupations constitute the chief factors of success. Some young men do not possess the capacity to acquire the requisite managerial ability to manage a farm profitably. It is quite probable that such persons would do well to go to town and work under a foreman.

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PRINGLE, R. W., Adolescence and High School Problems (Heath).

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CHAPTER V

GUIDING PUPILS IN CURRICULUM CHOICES

The movement to extend the curriculum offerings of the school to meet the needs of various groups of pupils has progressed rapidly. One of the major problems of school administration, incident to this development, is that of providing situations that will enable pupils to gain "experience," in order that they may make an intelligent choice of a curriculum to suit their particular needs. Experience seems to indicate that far too little attention has been devoted to this problem. Too frequently, it is assumed that pupils choose a vocational curriculum with clearly defined purposes. A glance at the declarations of purpose of pupils, shown on page 71, will indicate the error of such an assumption. The points of view expressed in the following quotations further illustrate the need for more adequate preparation of pupils prior to their entrance upon a vocational curriculum.

Case 1. Principal *A* was discussing the proposed department of agriculture before a group of school patrons, assembled for voting the necessary funds. "Now," said he, "the great advantage of work in agriculture is that it enables us to provide courses for those who do not get along well in other studies. The teachers find that some pupils are dull in such subjects as Latin and French. The practical turn given to the agricultural work will appeal to such boys."

Case 2. The following statement was recorded after an interview with the principal and the teacher of agriculture regarding the selection of boys for an agricultural curriculum. Said the principal, "We have a great many boys in high school who do not get along well with abstract studies. As I view it, people exhibit three kinds of intelligence,

abstract, mechanical, and social. Now if a pupil is lacking in one or two of these he is quite likely to be proficient in the other. Those boys who are not good in abstract work will derive a maximum amount of benefit from agriculture, which, as you say, deals with the mechanical and practical problems of the farm. If these boys could be given something to do with their hands, much of our trouble in getting them adjusted to school work would be solved.''

Case 3. At a meeting of farmers, a superintendent expressed himself as follows regarding the need and function of the newly established course in agriculture: ''There are a good many farm boys in our community. This work is exactly what these boys need, because it teaches them how to be better and more successful farmers. Every one of them ought to be interested in the course.''

Case 1 typifies the conception that an agricultural curriculum is designed for the dullards and the ne'er-do-wells. Such a conception thwarts the basic principles of vocational instruction. The fallacy in Case 2 is quite evident, since the findings of educational psychology in no wise warrant such general conclusions regarding the presence or absence of different types of ability. There appears to be a high correlation among the three types. The fact that a pupil seems to possess little ability to progress in a subject like Latin is no indication that he will do well in agriculture. In Case 3 the notion prevails that because a boy is born in the country he must necessarily be interested in agriculture. When the true interests of many farm boys are discovered, we find that they have ambitions for a professional career or a career in an urban industry. Likewise, many city-bred boys find in a farming occupation the opportunity for self-expression and the keen satisfaction which the farm boy may be inclined to seek elsewhere.

The problems of prevocational instruction.—*Mindful of* the need for more adequate guidance of pupils in curriculum choices and recognizing the importance to the pupil of an intelligent choice of an occupational objective, school administrators have sought to provide a school organization in which the principle of self-discovery will be utilized by the

pupils. For the most part, such organizations have provided (*a*) information about available courses provided by schools together with the occupational objectives of these courses, (*b*) information concerning accessible occupations, and (*c*) certain try-out experiences of an industrial, commercial, or agricultural nature. As a result of experience, mainly in junior high schools, there appears to be consensus of opinion on at least three points:

(1) Information about occupations does not constitute a test of interest or ability. Therefore, such information alone does not constitute an effective basis for selection of objectives or courses of study.

(2) There must be actual participation on the part of pupils in a variety of occupational experiences.

Such contacts with occupations must be made under conditions approaching those of natural and normal employment. It is obvious that participation in the whole range of occupations is impossible under ordinary school limitations, therefore, experiences should be provided in phases of occupation groups, such as, building trades, metal trades, commercial arts, or agricultural occupations.

(3) The pupil's participation in a "type" occupation must include a wide variety of experiences involved in that occupational group. For example, in participating in an agricultural occupation, opportunity must be provided for experience in assuming full responsibility in planning, conducting, and managing a plant or animal enterprise, and in gaining skill in performing the various manipulative operations.

It will be a long time before adequate finding and prevocational training programs can be set up in the smaller high schools. Considerable progress has been made in the larger centers, especially with the junior-senior high school plan of organization. Even with the advantages of a variety of shops and laboratories and a corps of specially trained teachers, much remains to be achieved in providing efficient guidance in the choice of objectives and curricula. In the

small high school, with limited funds, meager equipment and often inadequately trained teachers, the problem is an extremely difficult one. In these schools the most constructive work so far accomplished has been that of conducting junior projects, or boys' and girls' club work. The difficulties in prevocational work are increased in such schools by the lack of a sufficient number of individuals having similar interests. In centers having large schools, classes may be formed whose members are interested in much the same occupations or groups of occupations and for these pupils, it is feasible to provide equipment and a teacher having special training.

Junior project or club work.—As a result of the passage of the Smith-Lever Law, junior home projects or boys' and girls' club work has been conducted by the extension services of the land-grant colleges of agriculture, working independently or in coöperation with state departments of education. Boys and girls have been encouraged to enroll for some type of productive work, which is conducted at home. When such projects have been conducted under the right type of educational guidance and leadership, they have served to stimulate boys and girls in wholesome school and home activity and have vitalized their interests in systematic instruction. The projects possess excellent values in the educative process, since boys and girls come to realize that the problems of farm and home are worth studying, and that the school work has an immediate value in meeting life situations. Through demonstrations and competitions, pupils are taught to work coöperatively. The ownership of the projects teaches self-reliance and responsibility. A junior project enables the teacher to vitalize the work of the classroom, because the instruction may be built on a background of farm and home experience and problems. Successful project workers develop an improved attitude toward school work, Club meetings constitute one of the most valuable agencies for civic, social, and leadership training.

Aside from the general values of junior projects and clubs

in improving the quality of elementary-school instruction, such activities may possess significant prevocational values. The opportunity to enter into group or "club" activity, the opportunity to assume responsibility and actually manage an enterprise which is typical of the farming practiced in the region, and the opportunity to participate in the performance of the manual part of the work, emphasize such values. The "head, heart, hand, and health" aspects of the work, as signified by the 4H emblem, emphasize the broader, social-civic, recreational, and personal-happiness phases of farm life. When the club work is extended over a period of several years, thereby involving a variety of plant and animal enterprises and possibly a managerial enterprise or a series of mechanical jobs, a fairly complete cross-section of the local farming practices is undertaken by the pupil. District, county, and state contests serve to stimulate interest in achieving creditable results on the part of each project worker. When conducted under the guidance of trained leaders, club projects are an effective device for giving prevocational instruction in rural districts.

Young,[1] in studying the enrollment of junior-project workers in New York State from 1920 to 1924, shows that 73.3 per cent of the pupils conducting projects were enrolled in one-teacher schools and that 9.3 per cent were enrolled in two- and three-teacher schools. In Tables XXVIII and XXIX, excerpted from the same study, Young shows the distribution of pupils by agricultural projects and by age groups. It will be observed from these data that the modal age of project workers is between 12 and 13 years, and that the enrollments begin to decrease after the fifteenth year. Young further states that approximately 99 per cent of the project workers were enrolled in the public schools. In addition to such data as these, we should make many studies of junior-project work with special

[1] Young, Paul R., An Analysis of the Enrollment in Junior Projects in New York State. Thesis, Cornell University.

reference to the influence it exerts upon the choice of curriculum, if the young worker subsequently enters high school, or upon the choice of a special vocational school. The scanty data that are at present available do not lend themselves to scientific conclusions but there seems to be a significant bearing of the junior project or club experience upon the decision to follow an agricultural pursuit.

TABLE XXVIII

NUMBER OF PUPILS ENROLLED IN DIFFERENT AGRICULTURAL JUNIOR PROJECTS IN 1920–24 IN NEW YORK, WITH THE MODAL AGE IN EACH GROUP *

Project	Number of pupils enrolled	Modal age
Garden........	13,581	12.2
Potato.........	6,836	12.5
Corn..........	1,159	12.4
Bean..........	358	12.0
Poultry........	12,582	12.5
Calf...........	2,899	12.9
Pig............	1,163	12.8
Sheep.........	374	12.4
Rabbit........	878	12.8
Cow testing....	170	15.6

* Young, P. R., Thesis, An Analysis of the Enrollment in Junior Projects in New York p. 27.

Farm try-outs.—Because their equipment includes land, machinery, and dormitory facilities, special schools of agriculture are able to offer excellent opportunities to city and village boys who desire some participation in farming as a part of their prevocational training. Such opportunities may be organized as a portion of a prevocational program conducted in a city school, in which case the pupils add the farm experiences to those already gained in other groups of

occupations. On the other hand, such farm try-outs may be given independently of any other prevocational plan. In such instances the courses are brought to the attention of boys and young men who have some predilection for a farm calling.

TABLE XXIX

AGE DISTRIBUTION OF PUPILS ENROLLED IN JUNIOR PROJECTS IN NEW YORK, IN 1920–24 *

Age groups	Enrollment in agricultural and homemaking projects	Enrollment in agricultural projects
6	271	180
7	741	495
8	2,215	4542
9	4,541	3065
10	8,753	5369
11	10,599	6301
12	12,588	7225
13	11,474	6566
14	8,891	5087
15	5,026	2830
16	1,856	855
17	793	303
18	298	126
19	117	45
20	18	11

* Young, P. R., Thesis, p. 25.

This type of service constitutes one of the most valuable contributions of the special school. When a group of boys is assembled under proper conditions of living and leadership at a special school, a wide range of experiences may be provided in plant and animal enterprises and in mechanical work. One of the limiting factors of the try-out courses is

the difficulty of providing managerial responsibilities for a complete season's undertaking.

Extending the services of the school or department.—The thoughtful teacher is constantly on the alert to extend the services of his school or department in order to reach the largest possible number of persons in the patronage area of the school. To be effective, his efforts in this direction must be based upon a systematic analysis of pupil needs. The gathering of facts regarding such needs and the establishment of suitable courses to meet them constitute a vital challenge to the effort and ability of the teacher. Personal contacts obtained by means of systematic surveys, and a simple plan of keeping cumulative records are basic steps in making analyses of local needs.

It was suggested in Chapter IV that a knowledge of the raw material to be instructed is a prime factor in effective teaching. Up to the present time, the following classes of persons have been served by agricultural schools or departments: junior-projects or club workers, pupils in the full-time classes in the high school, pupils enrolled for part-time or short-term instruction during the winter months, and members for adult farmers meeting at appropriate hours either during the day or during the evening. A simple survey form, such as that indicated in the Appendix, will be found helpful in locating pupils in the patronage area and in determining their interests and motives. Supplementing the survey, there should be on file in the school, as a part of the permanent records, a summary of the survey data for each pupil for each year, together with significant information regarding work taken, courses completed, and practical interests. Such records are valuable both to the teacher who remains in a school for several years and to the new teacher.

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interest to the principal or teacher in an agricultural curriculum are the following: adolescence and growth (11–47); the adolescent in the nation (48–80); systematic aspects of adolescent mentality (81–125); personality in adolescence (126–162).

Part III is devoted exclusively to problems of guidance. Special consideration is accorded educational and vocational guidance, health guidance, moral guidance, and psychology and general guidance factors.

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CHAPTER VI

CONSTRUCTING CURRICULA AND COURSES OF STUDY

Curriculum and course defined.—A *curriculum* is here regarded as a group of units of instruction systematically organized for any pupil or for any clearly differentiated group of pupils. It extends through a definite period of time and usually leads to a certificate or a diploma. It represents a sequence or group of courses to which a pupil is restricted in his choice of work. To illustrate, a curriculum for college entrance would include units in English, history, science, mathematics, and an ancient or modern language. An agricultural curriculum may include units in English, history and civics, science, mathematics, and selected units in agriculture. Again, a curriculum for a part-time group of agricultural students assembled for a two-months' winter term may include such units as mechanics, farm management, business English, and business arithmetic. From the standpoint of the builder of a curriculum for a vocational group, the units of instruction may be grouped into two classes: (1) vocational units, and (2) non-vocational units. In the first group are found units derived from the content that functions directly in performing the activities of the vocation, while in the second group are found certain "contributory" or "service" subjects. This latter group of units includes content designed to improve the pupil's social-civic and avocational abilities and his understanding of the scientific principles which underlie man's activities.

In this chapter, major consideration is given to the selection of content in vocational units only. The student is referred to the study outline at the close of this chapter for suggestions in regard to the selection and arrangement of non-vocational units in an agricultural curriculum for pupils enrolled for full-time instruction in the high school.

A *course of study* is here regarded as the *kind, amount,* and *organization* of content in any unit or units of instruction offered within a curriculum. The kind of content determines *what* is to be taught. The amount of content is measured by the scope of the specific knowledge to be imparted, the specific skills and attitudes to be developed, and the time allotted to the assignment. Thus attention is focused on the content that is most relevant to the aims which have been set. By the organization is meant a systematic and orderly plan for teaching the content selected within the limitations of the time assignment, At this point, problems of methods of instruction are involved. The end to be accomplished in a course of study, therefore, is to suggest in outline the organization of content which may be drawn upon for the specific *lessons,* or units of teaching. The course of study embodies an inventory of selected content, an indication of emphasis expressed through a time assignment, an organization of the material in terms of lessons, and some suggestions as to appropriate means and methods to be employed in teaching.

The responsibility for course building rests with the teacher. His personality and methods of thought and expression will determine its general form and content. He may gain suggestions from outlines and syllabi, and from the experience of his predecessors and of his colleagues in other schools; but he himself must finally prepare the course in order that it may fit his own aptitudes and abilities and meet the needs of a particular group of pupils at a particular time. Furthermore, the course should reflect the accumulation of the teacher's experience from year to year; otherwise

it becomes static. "Turning the barrel over" at the end of the year, and merely repeating the same course without modification in the light of experience, indicates failure to meet fully the needs of the pupils. In choosing the content of instruction for the course, the teacher must be guided by two major factors: (1) the characteristics and needs of the pupils to be instructed; and (2) the specific requirements of the vocation for which training is to be provided.

Characteristics and needs of pupils.—By definition, a curriculum is designed to meet the needs of the individual pupil or of a clearly differentiated group of pupils. The units of instruction comprising the curriculum must, therefore, conform to the demands upon the curriculum as a whole. In Chapter IV, attention was directed to the individual differences among pupils in age, farm and school experience, environmental conditions, native and acquired traits and interests, ambitions and motives. The fact that good teaching recognizes and provides for these differences was stressed. It is the problem of the teacher, in making courses of study, to consider the individual differences of pupils and to prepare courses to meet their particular needs. The all-too-common practice of planning courses and then attempting to fit pupils to them must yield to the practice of making the pupil the central factor in instruction.

Because time is limited and public funds must be expended in a reasonable manner, the adaptation of courses to meet individual needs in all particulars will of necessity be restricted. Certain limited groups of pupils possessing a maximum of common characteristics and aims must be discovered from year to year. Four relatively distinct groups challenge our attention; those who intend to complete the high school course; those who desire the maximum vocational benefit during a one-, two-, or three-year period; those who can return to school for a short-term winter course; and, finally, those who can come together for a series of evening

class meetings. These groupings are especially significant, since, in the administration of the school, specific courses may be set up to meet their needs, without excessive additional expenditures and in keeping with types of organization that already exist or are not difficult to attain.

The aims and length of courses and the special content selected vary with the characteristics and needs of the groups. A group consisting of several village boys with no farm experience and with hazy vocational objectives presents quite a different problem in course building from a group of farm boys coming with a background of a lifetime on the farm where opportunities for supervised practical work abounded. Likewise, a group of young men assembled for a short-term winter course presents different problems in kind, amount, and organization of content from a group of full-time pupils looking forward to graduation. From year to year, in the same general group, marked differences will be noted. Special suggestions regarding methods of studying the interests and needs of pupils are discussed on page 99.

Requirements of the vocation.—If specific vocational aims are to be realized through teaching, the content of instruction must be derived from the needs of the workers and the abilities required of them in performing the tasks of the vocation. To inventory these abilities is one of the most difficult tasks which the maker of courses of instruction performs. Such an analysis constitutes an acceptable procedure for the selection of content. Reduced to simple terms, the task of the course-maker may be stated in five fundamental steps, as follows. These steps are the *teacher's problems.*

1. Determining types of farming and related occupations as the sources of course aims.
2. Arranging enterprises to make up curricula.
3. Selecting farm jobs for each unit.
4. Preparing time allotments.
5. Organizing the course.

1. Determining types of farming and related occupations as the source of course aims.—The significance of types of farming and specific agricultural occupations as the source of course aims was stressed in Chapter II. The suggestions here presented are designed to guide teachers in setting up aims in keeping with local types of farming and occupations. Two sources of data should be made available in such determinations: (1) statistical data and summaries already collected; and (2) special surveys made by the teacher.

Data already available.—Valuable summaries may be made by the teacher from the United States census reports, special state agricultural surveys, farm management records, soil surveys, geological surveys, climatic records, topographical data, rural surveys, and from other miscellaneous sources. The following summaries, prepared by the teacher at Bath, Steuben County, New York, is illustrative of what may be done with such data.

From the census data of Steuben County, it will be clear that only gross totals and averages are available. For example, in obtaining the number of dairy cows per farm, the total number for the county has been divided by the number of farms. No indication is given regarding the distribution of enterprises on the farm or the emphasis given the enterprises by farmers. Under "size of farms," is shown a distribution of the farm areas. This has considerable value for the teacher. Similar distributions are needed for individual enterprises. Another limitation of the census data is that no recognition is accorded local farming types, since the county is not an agricultural unit. Such summaries, however, even with these limitations, serve to indicate the general status of agricultural practices for a region.

Farm-management studies are especially valuable since they indicate the distribution of enterprises, the emphasis placed upon them, and the factors of efficiency, all of which are bases for course building. Such a study is illustrated in Table XXXI. From the data it will be noted that cotton contributed

from 84.6 per cent to 91.5 per cent of the income on the farms studied and that the farmers in the more efficient group worked more efficiently, used their horses to better advantage, grew more acres of cotton, corn and grain, tilled larger farms

TABLE XXX

CENSUS DATA FOR STEUBEN COUNTY, NEW YORK

Size of farms

Number of acres	Number of farms
3–9	207
10–19	255
20–49	538
50–99	1522
100–174	2304
175–259	903

Significance of enterprise frequency

Enterprise	Unit
Horses per farm	2.8
Dairy cows per farm	6
Sheep per farm	5
Poultry per farm	48
Dairy heifers per 100 cows	18
Total acres per farm	124
Acres of crops per farm	56
Acres of cereals per farm	16.7
Acres of hay per farm	35.1
Acres of potatoes per farm	3.1

and kept expenses low. Another use of data already available is shown in the Trumansburg survey (page 116), in which the farms were distributed according to two distinct soil types as indicated by the soil survey of the region. Before at-

TABLE XXXI

FARM-MANAGEMENT SURVEY OF TWENTY-ONE FARMS IN FOUNTAIN INN COMMUNITY, S. C.

Management Factors	Average of 11 farms making labor income above $2000	Average of all farms	Average of 10 farms making labor income of $300 or less
Crop acres per man equivalent	19.3	16.6	16.0
Crop acres per work animal	18.3	19.7	20.3
Productive work units per man equivalent	182	160	136
Productive work units per work animal	94	88	88
Acres of pasture	31	20	14
Acres of woods	35	20	20
Acres of cotton	58	41	22
Acres of corn	21	17	16
Acres of grain	23	13	10
Acres of legumes (mainly second crop)	13	9	7
Pounds fertilizer applied per crop acre	415	408	325
Capital invested	$24,109	$17,350	$13,196
Acres in farm	174	119	94
Acres in crops	106	75	53
Number of man equivalents	5.5	4.5	3.3
Number of work animals	5.8	3.8	2.6
Number of cow equivalents	6.1	4.5	2.6
Expenses per hundred dollars of income	$43	$54	$72
Pounds yield cotton per acre	417	388	326
Yield index of cotton	223	208	174
Yield of corn per acre (bu.)	24	22	18
Yield of oats per acre (bu.)	33	29	25
Returns per acre of cotton, including value of all cotton seed	$139	$128	$105
Returns per cow equivalent, excluding home-used dairy products	48	39	13
Total farm receipts	$8497	$5369	$2319
Total farm expenditures	3631	2914	1664
Labor income	3371	1414	−136
Per cent of total receipts from:			
Cotton	84.6	84.4	91.5
Corn	2.4	2.5	0.8
Grain	1.2	0.8	0.3
All other crops	2.6	4.1	2.7
Livestock	5.6	3.8	0.0
Miscellaneous	3.6	4.4	1.7

tempting to make individual surveys for his community, the thoughtful teacher will utilize every resource at his command in assembling pertinent data which have been gathered by others.[1]

Surveys prepared by the teacher.—Data gathered from outside sources are not sufficiently explicit to do more than indicate a general status. By far the most effective means open to the teacher for determining what the farmers in his area are doing is a special study or survey. Such a survey enables one to determine the facts in a truly scientific manner. It is essential, therefore, to use a definite survey instrument on the farms in order to ascertain the facts, for if one travels about a community, making general observations and conversing casually with a few farmers, one is very likely to form wrong impressions regarding failures or successes, since it is common to notice exceptional things and easy to disregard the usual. Surveyors in all types of studies have come to recognize the importance of the *normal* in assembling survey facts. Such data are quite likely to disprove snap judgment and popular notions. Facts are much safer than mere opinions.

There is a technique of securing and evaluating data which surveyors should possess. Three aspects of this technique are of special importance: (*a*) formulating specific purposes to be accomplished; (*b*) securing the data from individuals on the basis of observation of things and materials; and (*c*) interpreting the data gathered and drawing conclusions therefrom.

(*a*) *Formulating purposes.*—Farm-management specialists have made numerous studies of agricultural practices in setting up basic principles to guide others. Their success has been dependent to a large degree on the definiteness of their aim and the narrowness of the field to be surveyed. They have sought to determine such facts as the cost of feed, labor,

[1] Bul. 127, Connecticut Agricultural Experiment Station, "A Description of Connecticut Agriculture," illustrates a type of study of special value to teachers of agriculture in determining local types of farming.

interest, and depreciation, in producing milk from Holstein herds in a given area. Appropriate purposes may be determinated from the answers to three questions: (1) In what enterprises are the farmers engaging? (2) What is the scope of each enterprise? (3) What significant facts may be assembled which will indicate special practices, quality of crops or stock, efficient use of labor and equipment, kinds of mechanical appliances?

(*b*) *Securing data.*—Farmers are usually willing to furnish the information desired by the surveyor. Enterprise surveys designed to assist in formulating course aims usually do not include references to valuations and amounts of money received or expended. The omission of these data tends to remove the suspicion that the facts asked for may have some connection with taxation and assessment. In gaining the farmer's confidence, the simple request for the facts as an aid in school work is usually sufficient. Another important factor is one's regard for the farmer's time when requesting data. The teacher should rarely expect him to leave his work.

Many teachers have used *record-taking* as a teaching device with older pupils. Each pupil is asked to secure the data concerning his home farm and also two or three other farms in the neighborhood. When this practice is followed care should be taken to give the boys careful instructions concerning the manner of approaching the farmers, asking the questions, and tabulating the data.

The accuracy of the interpretations of survey records is greatly affected by the number of farms studied. If a large number of cases are used, the averages will give very reliable indices to conditions as a whole, whereas an individual record would be almost worthless. The more the individual records appear to vary, the greater the need for increasing the number of cases in order to obtain dependable summaries and averages. It will probably be impossible to get survey records from all the farms in the patronage area, because of

lack of time and funds. However, the number should be large enough to eliminate the conspicuous sources of error which a small number reveals. In some communities, a small number may be fairly reliable; in others, the number must be large, to absorb the effects of individual variation in the records. Experience seems to indicate that the teacher needs from 75 to 100 cases of representative farm records to insure reasonable reliability of summaries and averages. Furthermore, he is urged to obtain, for the entire area, records covering a period of several years.

The criticism is sometimes made that many farmers do not keep records and accounts, and that therefore the data secured are not accurate. The data given by farmers have been checked many times. The following is an illustration of such a check. One teacher, after taking the estimates of 122 farmers concerning the production of milk from their herds, checked the data against the records of the local milk station and found that the average error was only 1.7 per cent. Farmers who have daily contact with the various enterprises and activities on their farms are able to make reliable estimates even though cost accounts are not kept. One should not overlook in this connection the growing tendency of farmers to keep cost accounts of the farm business.

Special forms providing for an orderly entry of data are a necessary part of survey work. The form shown on page 368 of the Appendix is illustrative of such a device. One form should be used for each farm. Numerous checks are available for testing the accuracy of the answers. For example, the total area of the farm should check with the areas of pasture, woods, cropped land, waste land, and swamps, a few acres being allowed for highways and the farmstead.

(*c*) *Interpreting data.*—Two factors are of chief importance in interpreting data: *frequency* and *scope*. In considering the factor of frequency we are concerned with the *number* of farmers engaged in a particular enterprise or practice, while in considering the factor of scope we are con-

cerned with the *extent* to which the farmer is engaged in it. such elements as area of crops, number and quality of animals, amount of fertilizer and lime purchased, and estimated share of farm income derived from the major sources, are measures of scope.

The technique of making summary distributions is relatively simple. A blackboard or large sheet is needed. By means of vertical columns the animal and crop enterprises may be listed across the top, showing variables of scope such as number of dairy cattle, 1–4, 5–9, 10–14, 15–19, or number of acres of corn, 1–4, 5–9, 10–14. The enterprises for each farm are then distributed on the chart by placing a check in the proper space. When all farms are entered, summaries may be prepared as indicated in Table XXXIV.

The summaries of enterprise surveys shown in Tables XXXII–XXXV illustrate the method of organizing the data in the completed form. The suggestion has already been made that the enterprise or enterprises from which the largest part of the total farm income is derived should be the determining factor in designating the type of farming. Whereas in the enterprise survey no definite record is made of the sources of income, the discerning teacher will be able to approximate, by means of his knowledge of prevailing prices and of the commodities which the farmers in his area usually have for sale, the major sources of income.

In determining types of farming as a source of course aims for special agricultural schools, the situation is similar to that which prevails in high schools except that the patronage area usually extends over several counties or agricultural regions. In such instances, data from the census and agricultural surveys are more applicable than in a smaller area, for as the area studied is extended the data tend to be less influenced by political boundary limits. Records taken in smaller areas will serve as valuable guides in determining enterprise emphasis and distribution in distinctive types indicated by census summaries.

TABLE XXXII

ENTERPRISE SURVEY OF FARRAGUT COMMUNITY, TENNESSEE

Enterprise	Number farms reporting	Total scope*
Barley	6	67
Corn	45	780
Oats	15	81
Rye	1	3
Wheat	30	605
Tobacco	2	4
Alfalfa	2	10
Alsike clover	1	12
Corn silage	9	81
Corn and sorghum	1	10
Cow peas	6	96
Cow peas and millet	6	71
Cow peas, sorghum and millet	1	10
Johnson grass	1	3
Millet	1	1
Oat hay	5	25
Red clover	6	95
Red clover and timothy	2	9
Red clover and red top	2	44
Red clover, red top and timothy	6	120
Clover, red top, timothy and orchard grass	2	154
Red clover and orchard grass	2	90
Red top	10	170
Red top and timothy	24	883
Sorghum	8	34
Soy beans	46	648
Soy beans, cow peas and millet	2	50
Soy beans and cow peas	6	40
Soy beans and millet	2	20
Sudan grass	8	25
Mixed grasses	8	204
Horses	41	106
Mules	36	121
Jacks and jennets	1	1
Beef cattle	12	244
Dairy cattle	46	493
Hogs	45	509
Sheep	2	25
Poultry	50	4650
Bees	10	45
Apples	3	5
Cherries	1	2
Grapes	1	0.1
Peaches	1	6.2
Pears	1	0.2
Market vegetables	8	25.8
Home orchard	43	60.2
Home graden	50	45

* Scope refers to acres of crops or number of animals.

Quality of animals and poultry, per cent grades, beef cattle 92.6; dairy cattle, 96.6; hogs, 76.4; poultry, 68.8.

Recommended Types of Course Organization *

Type 1	Type 2
First Year. Dairy cattle, poultry, hogs, horses, mules, beef cattle, bees and sheep.	*First Year.* Dairy cattle, poultry, hogs, hay and forage, corn, miscellaneous.
Second or First Year. Hay and forage, corn, small grains, tobacco.	*Second and Third Year.* Managerial phases of above enterprise, home orchard, home garden, rural economics and rural sociology.
Third Year. Home orchard, home garden, farm management, rural economics, rural sociology.	*Third or Second Year.* Horses, mules, beef cattle, sheep, peas, small grains, tobacco, miscellaneous.

* Bul. 1, University of Tennessee, College of Agriculture, Knoxville, 1922, pp. 1[illegible] 1; 31–33.

In studying the related agricultural occupations prevailing in a patronage area, two considerations are pertinent: (1) the extent of the occupation; and (2) opportunities which the occupation affords to persons trained to enter it. An inventory of such occupations as herdsman, milk tester, salesman, gardener, mechanic, is all that is needed in the first instance. Such summaries are not difficult to secure. In making such studies, however, too little emphasis has been laid on an evaluation of the opportunities, both in extent and nature, open to boys and young men after completing vocational training to enter such occupations. Here accumulative data extending over a period of twenty-five years or more are of the greatest value. Definite understandings with such executives as managers of corporations, sales managers, ice-cream manufacturers, supervisors of cow-testing associations, and creamery managers should be had before attempting to set up vocational courses. The requests that come to a school for herdsmen, farm foremen, and pupils trained for like occupations furnish a valuable guide in evaluating opportunities in these fields.

TABLE XXXIII

SUMMARY OF ENTERPRISE SURVEY FOR PATRONAGE AREA OF TRUMANSBURG HIGH SCHOOL

Enterprise	Average scope per farm	Per cent of farms conducting enterprises	Number of farms reporting
Dairy cows (G)	4.2	84.6	110
Dairy cows (B)	3.8	18.6	24
Heifers (G)	1.7	43.4	58
Heifers (PB)	2.0	15.5	20
Veal calves	3.6	44.2	58
Beef cattle	3.4	10.9	14
Horses	3.6	93	120
Mules	2.0	54.3	7
Colts	1.8	14.7	19
Ewes (breeding)	36.8	25.5	33
Ewes (yearling)	10.3	69.7	9
Bucks	1.2	17.2	23
Lambs	23.1	18.6	25
Fattening sheep	7.3	54.2	7
Brood sows	1.7	29.5	38
Other hogs	3.7	59.0	77
Pigs, weaned	7.9	23.3	30
Poultry	160.2	89.0	73
Ducks	20.0	13.2	17
Turkeys	11.9	69.7	9
Corn, grain	46.1	70.2	87
Corn, silage	3.2	37.9	47
Potatoes	1.5	81.4	101
Beans	11.8	57.2	71
Cabbage	6.6	12.9	16
Buckwheat	11.2	51.0	72
Wheat	13.1	70.9	88
Barley	5.4	34.6	43
Oats	10.4	80.6	100
Alfalfa	16.7	31.4	39
Hay	31.4	95	118
Orchard	2.6	13.7	17
Apples	24.5	3.2	4
Peaches	16.7	2.4	3.0

TABLE XXXIII—*Continued*

ENTERPRISES ARRANGED BY COURSES, TRUMANSBURG HIGH SCHOOL

First year:	
Farm poultry	50
Sheep	10
Field beans	50
Field corn	20
Shop	30
Second year:	
Poultry *	20
Sheep *	10
Potatoes	40
Cabbage	30
Garden and orchard	30
Shop	30
Third year:	
Horses	15
Sheep	30
Dairy cows	35
Swine	20
Hay and clover	25
Small grains	25
Mechanics	20
Fourth year:	
Animals continued	20
Crops continued	20
Farm management	80
Mechanics	30
Field studies	10

* Poultry continued, and sheep continued or started.

NOTES—The farms surveyed have been grouped as to soil types. Most of the pupils live on farms located on two major soil types. One type (Lansing) is alkaline in character and is adapted for beans, cabbage, small grain, clover and alfalfa, and commercial fruit and poultry on the steep slopes near the lake. The other type (Canfield) is acid in character and is adapted for corn, potatoes, buckwheat, and small grains, meadows and pasture, and sheep. Sheep and beans combine on the Lansing, and sheep and pasture on the Canfield. Poultry and sheep are the only animal enterprises of commercial importance. A choice is given between these enterprises for first- and second-year project work. In addition, a crop project is required each year. Here the pupil has a choice between corn and beans the first, and potatoes and cabbage the second year. Poultry, beans, and potatoes are selected by more boys than sheep, corn, and cabbage. Commercial poultry is confined to a small area, but there is some poultry on all farms. Poultry is increasing outside the special section.

TABLE XXXIV

SUMMARY OF ENTERPRISE SURVEY FOR PATRONAGE AREA OF GENEVA HIGH SCHOOL

FRUIT-GROWING AREA

Enterprise	Number of farmers conducting enterprises	Total scope of enterprises *
Corn (grain)	108	688
Corn (silage)	20	166
Corn (fodder)	26	64
Corn (sweet)	21	72
Potatoes	112	252
Field beans	16	38
Cabbage	88	476
Root crops	19	34
Buckwheat	16	134
Oats and barley	26	272
Oats	78	596
Peas	16	76
Barley	54	304
Wheat	109	1,504
Alfalfa	64	428
Hay	117	1,552
Apples	98	968
Peaches	56	254
Cherries	26	184
Pears	40	292
Truck crops	12	36
Nursery	16	82
Cows: 1–5	88	264
6–10	20	152
11 plus	9	186
Dairy heifers	64	116
Veal calves	86	384
Beef cattle	10	94
Horses	120	456
Ewes (breeding)	20	476
Brood sows	60	106
Other hogs	140	580
Poultry	116	12,462
Ducks	17	174
Bees	11	380

* Acres of crops or number of animals.

TABLE XXXIV—*Continued*

DISTRIBUTION OF INCOME FROM ENTERPRISES, ARRANGED IN SEQUENCE

Number of farms producing		Number of farms receiving income		Total value of income	
Hay	117	Apples	80	Apples	$103,860
Potatoes	112	Wheat	76	Cherries	31,680
Wheat	109	Cabbage	72	Wheat	26,835
Corn	108	Potatoes	64	Cabbage	17,280
Apples	98	Pears	33	Potatoes	15,552
Cabbage	88	Hay	26	Pears	8,778
Oats	78	Cherries	24	Hay	5,720
Alfalfa	64	Peaches	21	Peaches	3,150
Peaches	56	Corn	18		
Barley	54	Sweet corn	18		
Pears	40	Peas	16		
Cherries	26	Oats	12		

GENERAL FARMING AREA

Enterprise	Distribution of acres or number of livestock							
	1–5	5–9	10–14	15–24	25–40	100–199	200–399	600
Beans	3	3	1	1				
Potatoes	3	1	1					
Corn (silage)	1	1	.....	1				
Corn (grain)	5	9	1					
Wheat	...	3	5	7	3			
Oats	1	8	4	4				
Barley	4	5	2	1				
Fruit	3							
Hay	...	1	5	6	4	2	1	
Horses	12	4						
Cows	8	8	1	1				
Hogs	4	8	1	.....	1			
Poultry	...	...	1	.....	1	8	1	1
Other cattle	4	5						

TABLE XXXIV—*Continued*

ENTERPRISES ARRANGED BY COURSES, GENEVA HIGH SCHOOL

FRUIT-GROWING CURRICULUM

First year:	
Apples	60*
Pears	12
Peaches	10
Plums	10
Cherries	8
Poultry	40
Farm shop	40
Second year:	
Corn	18
Potatoes	20
Cabbage	20
Beans	15
Truck crops	10
Small grains	24
Buckwheat	5
Hay	15
Garden	10
Pasture	4
Farm shop	40
Third year:	
Dairy cattle	25
Sheep	20
Hogs	10
Horses	15
Dairying	10
Raspberries	10
Blackberries	10
Strawberries	10
Farm shop	60
Fourth year:	
Farm management	70
Mechanics	55
Marketing	20
Water supply	15
Farm shop	20

* Double periods.

GENERAL-FARMING CURRICULUM

First year:	
Dairy cattle	90
Hogs	40
Poultry	30
Horses	20
Second year:	
Same as above.	
Third year:	
Tree fruits	25
Dairy cattle	35
Sheep	15
Small fruits	45
Farm shop	60
Fourth year:	
Same as above.	

2. Arranging enterprises to make up curricula.—Accompanying the enterprise survey data in Tables XXXII–XXXV are the groupings of enterprises which have been proposed by the teachers in the respective schools. From these it will be noted that at least two types of arrangement are used in grouping the enterprises into curricula. These may be classed as *similar* enterprises and *cross-section* enterprises. For example, in the courses outlined for the Farragut,[1] and Bath [1] schools, similar animal and similar crop enterprises are grouped together to form separate units. In the cases of the

TABLE XXXV

SUMMARY OF ENTERPRISE SURVEY IN PATRONAGE AREA OF BATH HIGH SCHOOL

27 farms surveyed in 1923; 16 farms surveyed in 1925

Enterprise	Number of farms		Total acres or animals	
	1923	1925	1923	1925
Corn (grain)	16	9	88	41
Corn (silo)	11	10	85	50
Potatoes	26	16	117	46
Beans	7	11	56	98
Buckwheat	12	7	105	109
Oats	27	16	412	166
Wheat	21	5	159	50
Alfalfa	7	8	48	35
Hay	27	16	1143	494
Dairy cows	27	16	256	153
Horses	27	16	95	67
Sheep	10	7	450	228
Poultry	27	16	1875	1890
Brood sows	5	....	10	
Colts	3	....	4	
Bees	2	....	11	

[1] Pages 114, 116.

TABLE XXXV—*Continued*

ENTERPRISES ARRANGED BY COURSES, BATH HIGH SCHOOL

First year:		Second year:	
Poultry	56*	Potatoes	20
Dairy cows	48	Corn	10
Shop practice	48	Beans	6
Dairying	12	Grain	7
Project plans	8	Hay	6
		Pasture	3
		Maintaining fertility	63
		Weeds	2

Third year:		Fourth year:	
Sheep	12	Shop practice	40
Swine	10	Potatoes	4
Horses	17	Corn	3
Farm management	40	Beans	3
Machinery	28	Grains	3
Project plans	10	Hay	1
Dairy cows	38	Fertility	24
Shop practice	22	Farm management	66
		Garden	12

Agricultural and community fairs 3 to 8 periods each year.

* Numerals in these courses refer to double periods.

Trumansburg[1] and Geneva schools, dissimilar enterprises, which represent a cross-section of the dominant enterprises, are included as curriculum units.

When the plan followed is that of grouping similar enterprises into curriculum units, opportunity is afforded to alternate two years of work each year. This is usually necessary in the majority of one-teacher departments. Many teachers feel that this plan provides an opportunity of teaching enterprises by comparison and contrast, which is difficult to attain in the grouping by the cross-section method. An outstanding advantage of the cross-section plan is that it provides an opportunity to teach the contributory enterprises directly in connection with the major enterprises of the prevailing type

[1] Page 119.

of farming. In the Trumansburg course, for example, opportunity is afforded in the first year to conduct the field-bean and field-corn enterprises in connection with the sheep and poultry enterprises, because the needs of the animals and birds for feed makes these crops important. The same situation obtains in the third year, where the raising of horses, sheep, cows, and swine is taught in connection with hay, clover, and small grain enterprises. In this case also, the enterprise grouping more nearly approaches a normal farming scheme.

When more than one type of farming is found in the patronage area of a school, it becomes necessary for the school to organize a curriculum for each type. In the one-teacher school it is difficult to provide for more than two curricula, because of the time limitations. The Geneva enterprise survey and the accompanying course arrangement illustrate this situation. Two distinct areas, that of fruit growing and that of general farming, are shown in the survey. To accommodate the needs of pupils from each area, provision is made for distinct groupings of enterprises for the first-year and third-year work. Because of common elements, the second-year and the fourth-year work remain the same. By alternating courses it is possible to administer such a curriculum without giving more than three years' work at any one time.

In arranging enterprises the following points are likewise important:

(*a*) *Important enterprises should appear early.*—From the table on page 67 it will be noted that scarcely 30 per cent of the total number of pupils enrolled in the high-school departments of agriculture are found in the third and fourth years. There are nearly four times as many freshmen as seniors, and two and a half times as many freshmen as juniors. When such data are scruitnized it will be clear that the important enterprises in the local types of farming should appear very early in a curriculum in order to accommodate a maximum number of pupils.

(*b*) *Shop work and mechanics should be distributed throughout the courses.*—As indicated in the courses above mentioned, farm shop work and farm mechanics, if conducted as a part of the agricultural unit, may be taught most effectively by distributing appropriate jobs among the course units. Such jobs, when organized about the productive activities and problems of enterprises, present situations likely to be motivated by real interest on the part of pupils, since the requisite skill and knowledge are needed in the performance of some productive work.

(*c*) *Unifying enterprises should appear late.*—Farm management is an illustration of a unifying enterprise, since it serves to coördinate the productive crop and animal enterprises into a successful business unit. The place of such an enterprise in a course organization is toward the end of the pupil's curriculum, since much of the content is derived from situations and problems incident to, or encountered in, crop or animal production. The practice of beginning the farm-management study in the third year and continuing through the fourth year meets with increasing favor, because it enables the teacher to assist the pupil in arranging for somewhat more appropriate supervised farm experience in farm management. Another circumstance which favors this arrangement is that in the third year the major enterprises are studied from an advanced point of view, especially if they have been included in the first- or second-year courses. This intensive study, when correlated with farm management, provides an excellent teaching situation for developing managerial ability.

3. Selecting farm jobs for each unit.—Each enterprise in a course is composed of specific *farm jobs.* A farm job may be defined as a unit of work on the farm, the accomplishment of which marks the completion of an important part of a year's work in a crop or animal enterprise, or in the management of the farm business as a whole. The following are some of the reasons for making the farm job the

basis of content selection and lesson organization and planning: (*a*) The farm job is an actual unit of work and as such presents a normal life situation which motivates pupil activity much more effectively than an artificial situation. (*b*) Instruction centered in farm jobs accords with the principle of "putting together those things which go together." Pupils discover in such situations the connections between "what," "how," "where," and "when" questions and the fundamental principles of science and business practice involved. (*c*) The solution of actual farm problems becomes the center of the pupil's thinking in farm jobs. Thus lessons based on farm jobs may have a clearly defined vocational objective. (*d*) Content organized in farm jobs provides for *specific* teaching, in terms of local agricultural practices, needs, and opportunities, and in terms of the problems encountered in the supervised farm practice of pupils. (*e*) Farm jobs provide a ready and systematic method of selecting and organizing content.

The key to determining the content of instruction of each course is to be found, then in the inventories of the specific jobs.

ANALYSIS OF JOBS IN THE DAIRY-CATTLE ENTERPRISE

TYPE I—*Maintaining the Grade Herd*

Preparing a plan of business organization
Deciding whether or not to keep cows
Choosing a market
Determining number of cows to keep
Deciding what breed to keep
Deciding what animals to buy
Planning a new dairy stable
Rearranging a dairy stable
Preparing a plan of financing the business
Keeping dairy herd records
Determining milk and butter fat yields
Numbering stalls
Identifying cows
Marketing cattle
Arranging and conducting the dairy-stable program
Handling the dairy heifer before freshening
Caring for the cow at freshening
Milking a cow at first calving
Milking cows more than twice daily
Preventing cows from kicking

Preventing cows from sucking
Keeping animals comfortable
Providing drinking water
Protecting cows from flies
Treating cows for lice
Grooming cows
Dehorning animals
Preventing common ailments
Treating common ailments
Preventing calf scours
Preventing contagious abortion
Ringing the bull
Leading the bull
Controlling the use of the bull
Exercising the bull
Caring for vicious bulls
Caring for the calf at birth
Teaching the calf to drink
Preventing growth of calf's horns
Marking calves for identification
Selling dairy animals
Disinfecting the dairy stable
Storing the manure
Whitewashing the stable
Operating ventilators
Cleaning the stable
Accrediting the dairy herd
Deciding on a ration for dairy cows in winter
Balancing the ration
Grinding the feed
Mixing the feed
Feeding silage
Feeding concentrates
Feeding hay
Feeding roots or pumpkins
Feeding mineral supplements
Conducting feeding schedule
Determining the feeding schedule
Deciding on a ration for dairy cows in pasture season
Turning cows to pasture
Feeding supplementary concentrates
Using soiling crops as pasture supplement
Using silage as a pasture supplement
Preventing bloat on pasture
Treating cows for bloat
Choosing a ration for dairy calves
Feeding milk to calves
Substituting skim milk for whole milk
Feeding dried skim milk
Feeding calf meals
Feeding roughage
Feeding concentrates
Keeping utensils clean
Turning calves on pasture
Feeding after discontinuing milk
Deciding on a ration for heifers
Choosing a ration for the dairy bull
Selecting the calf to raise
Deciding on a plan of breeding
Deciding on sire to buy
Determining time for freshening
Serving the cows
Drying cow off
Washing milk utensils
Sterilizing utensils
Deciding whether or not to use a milking machine
Operating a milking machine
Caring for a milking machine
Cleaning udders and flanks of cows
Milking with dry hands
Straining milk through cotton gauze
Cooling milk quickly
Keeping milk cool
Caring for the separator
Cleaning the separator
Adjusting cream screw
Separating farm milk
Shipping cream frequently
Drawing milk to station

Clipping the udder and flanks
Deciding on stock to sell
Fitting stock for sale
Showing animals to best advantage

TYPE II—*Maintaining the Purebred Herd*

Deciding on this type of dairying
Getting started in purebreds
Deciding on purebred cows to buy
Deciding on the herd bull to buy
Deciding on a ration for cows on test
Preparing the cow for test
Conducting the feeding schedule
Watering the test cow
Caring for the test cow
Milking the test cow
Testing the milk of the test cow
Taking and shipping check samples
Tabulating and summarizing test records
Negotiating for an official test
Caring for the cow at calving
Caring for the calf at birth
Teaching the calf to drink
Feeding the milk often
Feeding the milk warm
Substituting skim milk for whole milk
Raising calves on limited amount of whole milk
Feeding dried or powdered skim milk
Feeding proprietary and home-mixed calf meals
Keeping utensils clean
Feeding concentrates
Feeding hay or other dry roughage
Feeding silage
Feeding after discontinuing milk
Pasturing calves
Preventing growth of horns
Marking calves for identification
Feeding heifers after the milk period
Deciding on a plan of breeding
Choosing individuals for mating
Selecting individuals for sale and exhibition
Training animals to lead and pose
Feeding cows for sale and exhibition
Fitting for show
Shipping animals

The following cases represent the records of enterprises taken by teachers in two communities:

Case 1. Ninety-seven enterprise survey records showed that the dairy enterprise was of major importance in the community. The range of source of income was from 48 to 71 per cent. The average farm income was 63 per cent from the dairy-cattle enterprise. Minor enterprises were cash crops, hay, corn silage, oats, poultry, and swine. Eighty-six per cent of the farmers owned purebred sires. Forty-three per cent of the farmers had purebred herds. All but three farmers produced milk for the New York market. Five farmers had conducted advanced registry testing. Nine farmers had shown stock at local fairs and four

had shown stock at the state fair. Three farmers in the community had held auction sales of stock.

Because of the major significance of the dairy-cattle enterprise in the community, the teacher included all of the jobs listed in type 1 in his course of study. These he distributed in the following groups:

Organizing the business.
Managing the herd.
Maintaining sanitary conditions.
Feeding the herd.
Improving the herd.
Feeding and managing test cows.
Exhibiting and selling stock.

Case 2. One hundred and sixteen enterprise survey records showed that the dairy-cattle enterprise in the community was of distinctly minor importance. Cash crops, canning-factory crops, and poultry were major enterprises. Only four farmers had purebred sires. With the guidance and advice of the advisory board, who also checked the results of the survey, the teacher made the following selection of jobs in a dairy enterprise for his course:

Deciding whether or not to keep cows.
Deciding what breed to keep.
Rearranging the dairy stable.
Keeping dairy records.
Caring for the cow at freshening.
Preventing common ailments.
Teaching a calf to drink.
Feeding the calf.
Feeding cows in winter.
Feeding cows in summer.
Managing the bull.
Caring for the milk.
Handling stock at breeding time.

In Case 1 the dairy enterprise was important from the standpoint of its contribution to the farm income and the demands which it made upon the time and abilities of the farmer. This case represents one of the most intensive types of dairy-cattle farming. The teacher therefore was justified

in giving emphasis to all the activities and jobs indicated on the check list, because the boys were certain to encounter these jobs in the vocation. Quite in contrast to this situation is that illustrated in Case 2, in which dairying was a minor enterprise. Here there was relatively less need for a wide range of experience and a high degree of ability in conducting the dairy enterprise, as compared with the former case.

Space will not permit the inclusion of an extended list of cases in which teachers have selected type jobs to meet the needs of particular groups of pupils. When the teacher is guided by the major criterion of importance, and the needs of pupils to be instructed, little difficulty should be encountered in making a final selection. From the standpoint of achieving true vocational objectives, the chief difficulty is due to the readiness of teachers to take a suggested list of jobs, as in Case 1 and attempt to incorporate it into a course of study without regard to the systematic study of vocational situations and pupil needs as above described.

An important asset in making appropriate selections of jobs to be included in the course is an inventory of what the best practicing farmers are actually doing and what suggestions they may be able to make with respect to difficulties in performing their work. Such studies are illustrated by the work of Struck [2] and Armstrong and Lathrop [3] in analyzing the practices of farmers in performing repair and construction work on the farm, and by the work of Whittemore,[4] in studying the practices of dairy farmers. The following is an excerpt from the general summary of data made in this latter study. Equipped with such data as these, the teacher is in a position to evaluate somewhat more accurately the need of a particular enterprise in his community:

[2] Farm Shop Work, Struck, F. T., Bul. 1, Pennsylvania State College of Agriculture, Department of Rural Life.

[3] Farm Repair and Construction Work, Armstrong, F. E., and Lathrop, F. W., Monograph 4, University of Minnesota.

[4] Whittemore, V. C., Thesis, Cornell University.

PARTIAL SURVEY OF DAIRY FARMING PRACTICE OF 25 FARMERS IN PORTVILLE COMMUNITY

Average size of herd	30
Median size of herd	22
Proportion of cows to 1 heifer	3
Per cent purebred herds	12
Per cent grade herds	28
Keeping bull separated from herd	92
Sire running with heifers	32%
Using sire 7 or more years	45%
Milk production throughout year on half-and-half basis	48%
Production of winter milk	46%
Change from summer to half-and-half production	75%
Reasons for changing plan higher winter prices	17
Better yearly yield	6
Better labor distribution	11
Bred heifers at 18 months	36%
Bred heifers at 24 months	28%
Bred between 12-28 months	36%
Farmers buying purebred sire	92%
Farmers buying bull calves	60%
See bull before purchasing	84%
Buy bulls beyond 10-mile radius	64%
Factors considered in buying:	
Bull, pedigree	23
Bull, typical shape	17
Bull, size	16
Bull, color markings	13
Bull, reputation as breeder	9
Farmers keeping feed records	0
Record of feed bought at mill	75%
Kept individual milk records	28%
Advance register testing	4

4. Preparing time allotments.—By means of the time assignment, the *amount* of content to be included in the course is finally determined. Two factors appear to be significant in making such an assignment: (1) the amount of time which will be required to teach the selected jobs effectively; (2) an economical distribution of the time throughout the entire production year. In the first instance, the best criteria are the training and experience of the teacher, his observation, and his conferences with other teachers. "How much time will be required to teach a group of 15–16-year-old boys to test milk by the Babcock method?" is the type of question which must be answered.

The distribution of time throughout the year involves a preliminary and a final allotment. Since there are certain seasons when many jobs must be done on the farm within a short space of time, the teaching program will be somewhat congested at those periods. In the fall, for example, the crop jobs of select-

ing, harvesting and storing, and shipping produce, and the fall-fitting of ground must be completed within a short time, necessitating a careful choice of representative jobs and a time allotment for teaching that will realize the greatest advantages of objective and seasonal instruction. In the winter months, the work on the farm is less pressing, and, in sections where weather will not permit of field studies, the work must be confined to the classroom or nearby farms. At this time, certain other jobs may be taught to advantage, because time is available and comparatively less loss in efficiency results from doing the work out of season. In this class are such jobs as cleaning, setting up, repairing, and studying the incubator before operating in the spring; adjusting the knotter of the binder; setting up and repairing machines, and fitting them for use; sharpening tools; operating and repairing gas engines; cleaning harness; soldering; making halters; fitting rope for summer use; and installing power machinery.

Farm jobs differ widely in the degree of difficulty which they present to the learner, both in their manipulative and in their technical aspects. Other things being equal, the more skillful a learner needs to become in performing the work, or the greater the amount of technical knowledge needed, the greater is the amount of time required. It will be clear, then, that the factor of difficulty in teaching the content is pertinent in making an allotment of time.

The distribution of teaching time involves two steps, as already indicated: (1) a preliminary draft, and (2) a final form. A varying amount of trial and error is inevitable in securing a final adjustment. The periods available for a year's course are usually fixed. It is the problem of the teacher to adjust the assignment within the fixed limits in order to utilize the most appropriate content. The preliminary assignment consists in a trial distribution of time throughout the year. This may be accomplished readily by ruling a sheet into one wide column and 13 narrow columns, as indicated

below. The 12 months are important, because much of the instruction must be conducted outside of the classroom during the periods when school is not in session. Next, those jobs which should be included within the unit are selected and placed in the first column. Then the time is distributed in double periods (or other convenient units) by setting down for the appropriate month or season of the year the number of periods required to teach each job. During the months when school is not in session, a unit such as the number of hours or days may be used to advantage. In making this trial distribution, the aim should be to determine the ideal amount of time that will be needed in teaching each job. In the column "total time," will be the sum of the periods distributed throughout the year. When every job has received an allotment, the column should be totaled. The first total of this column usually shows an amount of time in excess of the available periods. Now comes the second step, or that of preparing the final summary of the course. The number of periods in excess of the time allowance is determined, and the preliminary draft is revised with a view of reducing the original assignment to conform to the time allowance. The course outlined on page 132 is illustrative of the work of a teacher in performing this assignment.

Farm Jobs	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	March	April	May	June	July	Aug.	otal

It is important that the course be cumulative in character and that revisions of time allotment be made from year to

TRUMANSBURG HIGH SCHOOL

Course of Study in Farm Management

Fourth year content.—180 double periods. Farm management 72 double periods and farm engineering and farm mechanics 108 double periods.

Time Distribution

	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mch.	Apr.	May	June
Farm management	6	8	10	6	6	8	10	5	9	4
Farm engineering	11	12	12	9	10	12	13	10	13	6

Outline of Content in Farm Management

Organizing supervised practice work. 1 S*

Studying farm papers. One double period each month.

Summarizing supervised practice of previous year. 3 S

Taking farm surveys in region. 1 S, 3 O

Evaluating Tompkins county survey records. 2 O

Tabulating and studying school surveys; marketing farm products in region, field trip to cooperative. 1 O, 2 N

Analyzing price fluctuations on important local products; costs of holding farm products for increase in prices, plans for selling local crops. 3 N, 2 D

* Course prepared by E. R. Hoskins. 1 S refers to 1 double period in September devoted to this activity. Throughout the outline the figure refers to the number of double periods and the letter to the month during which instruction will be given. In the original outline the time allotments were distributed in perpendicular columns headed with the name of each month.

Determining local types of farming, major and minor types, factors determining. 2 N

Determining trend in local farming types based on local and county surveys. 1 N, 2 D

Determining advantages and disadvantages of diversified and specialized farming in community, field trips. 2 D, 2 J

Evaluating intensive and extensive farming in region; field trips, measuring profits, systems compared, talks by farmers. 1 O, 1 N

Maintaining fertility of farms in different types; survey results of yields, methods of maintaining fertility. 1 J, 2 F

Determining place of livestock in local farming types; number and kinds, management, feeding, records, relation to size of farms, economic changes as affecting types of animals, purebred vs. grades, increase in value of young stock. 4 F

Determining relation of size of farms to efficiency in various types; trend toward increase or decrease in size, size related to profits, field trips to typical farms, best size for different types in region. 1 F, 2 M

Determining relation of capital to efficient management; relation of capital to profits, conservation and distribution of capital, relations of farmer and banker, talk by local banker, amount of capital as affecting management of different types, survey study and comparison of use of capital in different farming types. 2 M

Determining the place of life insurance among farmers; common forms and comparison, talk by insurance agent, factors determining best form for individual. 1 M

Evaluating factors in determining farm rentals; local methods of renting land, share of profits to tenant and to landlord,

talks by renters and owners, factors determining best system for young farmer in region. 2 M

Planning for and utilizing farm labor; man and horse labor requirements on local types of farms, factors affecting requirements, seasonal distribution, managing men, talks by farmer employers, substituting machinery for man and horse labor, tractor versus horses for farms in region, costs and relative efficiency, talks by tractor owners and non-tractor owners. 2 M, 2 A

Utilizing farm equipment; survey records of equipment on local farms, equipment requirements on different types of farms. 2 A

Determining and arranging the farm layout; field trips to study typical layouts; layout as affecting operating costs, labor income, arrangement of buildings on layout, interior building arrangement. 2 May

Determining appropriate cropping systems; survey of systems and evaluation of factors determining each, fertility as affected by rotation, relation of cropping system to profits. 2 May

Keeping farm records and accounts; systems, relation of type of farming to accounts kept, expanding project accounting to include farm business, income tax requirements, examining farm accounts in region, utilizing farm accounts as a means of studying the farm business. 4 May, 2 Je

Selecting a farm; essentials of a good location, essentials of a good farm, characteristics of a successful farm in this region, local variations in soil, topography, elevation, etc. as affecting farm value, values and prices of good and poor land in this section. 4 Je

year. As the work is conducted, suggestions and comments should be made on the original draft, to the end that the course for another year may be prepared with due regard for successful as well as unsuccessful experience. Such comments as "too little time," "too much time," "season too far advanced" are significant.

Four teachers in Minnesota, in collaboration with F. W. Lathrop,[5] have prepared valuable suggestions on the apportioning of teaching time in certain crop enterprises in selected areas. Lathrop, in reporting the study, suggests that crops may be classified according to similarity of culture, and that the time given to such crops as small grains is most economically used if the most important crop of that group in a given locality is studied intensively, i.e., used as a type crop. The other crops of the group can be covered by a brief review of the type crops and additional study, so far as differences and likenesses are concerned. He also suggests that the assignment is materially affected by certain problems in crop production which are common to more than one crop. Such problems as soil tillage, fertilizing, and improving plants are examples. If one of these problems is studied thoroughly and in detail in relation to a type crop, contrasts and comparisons may be made with other crops. Again, the local importance of the crop is an important element. The measure of acreage, the number of persons growing the crop, and the tendency of the crop to increase or decrease are valuable criteria in determining local importance. Time assignments, based upon these factors and the data appearing in Table XXXVII, have been recommended as indicated under the caption "Time assignment" in the same table.

5. Organizing the course.—The final step in course building is the organization of the selected content into an orderly plan. This step precedes or overlaps the choice of appropriate teaching methods. Its chief function is to determine

[5] Lathrop, F. W. The Visitor, Univ. of Minn., May, 1924.

TABLE XXXVII

Frequency of Enterprises and Time Assignment, In Field Crops

Barnum, Redwood Falls, Owatonna, Bertha, Minn.

Enterprise	Frequency of farmers growing crops				Time assignment (90-minute periods)			
	Barnum	Redwood Falls	Owatonna	Bertha	Barnum	Redwood Falls	Owatonna	Bertha
Corn	6	25	22	17	11	41	46	36
Potatoes	18	21	21	19	26	4	6	17
Roots	16	...	...	...	2	...	2	
Sugar beets	...	2	3	...	...	4		
Oats	20	25	13	19	16	24	12	13
Wheat	1	8	5	...	1	7	2	7
Barley	3	6	6	14	1	2	2	3
Rye	...	3	2	4	1	2	1	3
Hay	...	...	...	...	16	13	...	11
Timothy and clover	21	10	21	14	...	...	7	
Plants and seeds	...	...	...	...	...	...	6	
Alfalfa	...	15	16	...	...	6	16	14
Sweet clover	...	...	...	...	...	...	...	3
Pasture	...	...	...	...	...	2	3	2
Weeds	...	...	...	...	...	5	4	3
Flax	...	4	2	1	...	6	...	2
Soy beans	...	...	...	...	...	...	6	
Miscellaneous crops	...	...	...	...	2	7	6	2
Farm wood lot	...	...	...	...	3	...	...	4
Garden	...	...	...	...	13	7		
Fruits	...	...	...	...	11	7	10	10
Rotations	...	...	...	...	5	4	4	3
Soils	...	...	...	...	5	8	5	8
Farm management	...	...	...	...	17	...	...	2
Marketing	...	...	...	...	11	...		
Land clearing	...	...	...	...	...	...	...	2
Examinations	...	...	...	...	12	8	4	4
Projects	...	...	...	...	18	14	21	15
					171	171	166	164

the specific teaching objectives and the nature and scope of the content of each job.

We have seen that the farm job is a unit of work in a farming occupation. As such it constitutes an ideal unit of organization in teaching, because each job sets a definite aim and specifically limits the teaching content and method.

Attention has already been directed to three types of human ability, which manifest themselves in dealing, respectively, with *ideas, things,* and *people.* From the standpoint of teaching and learning, the abilities required in performing the multiplicity of farm jobs may be grouped into (*a*) those having to do primarily with sensory and motor skills, and (*b*) those having to do primarily with managerial skills or with making management or business decisions. In the class where sensory skills dominate are included types of ability which are developed through the use of one or more of the senses: such activities as culling poultry, selecting a cow from a group, for purchase, estimating the weight of a horse, determining quality in butter, and estimating the lime requirements of a soil by means of color tests. In the class where motor skills dominate are included those abilities which have to do with muscular dexterity. Milking, pitching hay, driving a team, swinging an axe, filing a saw, and mixing feeds are illustrations in point. In the class of managerial skills is included ability in making a decision or judgment with respect to plans, changes in organization, or work to be done. Such activities as determining what feeds to buy, how many and what breed of cows to buy, what variety of seed to select, what rotation to follow, and whether to increase the scope of the poultry enterprise, are examples.

In agricultural education the activities that involve sensory and motor expressions are termed *operative* activities, and those that deal with decision are termed *managerial* activities. No sharp line divides these two types of abilities; in fact, they are functions of each other. In organizing the course content, the teacher will give consideration to methods

and procedures that will develop certain desired operative abilities, i.e., abilities to perform through bodily activity. For example, if he wishes to train pupils to shear sheep, he will set up a situation in which the pupils will perform in an orderly way, and according to the best form, the operative tasks involved. In seeking to develop operative ability, the teacher may well make use of job specifications and directions such as the operations and practices in poultry raising recommended by Rice and Botsford,[6] including such jobs as culling, housing, feeding, illuminating, record-keeping, maintaining sanitation, preparing products for market, hatching, and rearing.

If, on the other hand, the development of managerial ability is the main feature of the content, the teacher will provide situations where steps and processes are studied for the purpose of determining the factors involved in decisions. The use of ready-made decisions is incompatible with farm management, since management situations can not be reproduced to advantage outside of the natural setting of the farm. The pupil must therefore make as many decisions as possible, since patterns can not be furnished so well as in the case of most operative jobs. The teacher must provide, in course making, opportunities for choosing data and experiences which determine factors involved in any given decision, and must take time to seek sources of information and to utilize the results of operative experience to the end that right mental attitudes may be built up.

From these conceptions of objectives and content, two suggestions may be made which will aid in course building:

(*a*) Each farm job of the operative type that is to be taught should be analyzed into the simpler operations and motor activities involved. For instance, in the job of culling hens, the operations of preparing to cull, catching and holding birds, and culling birds that are not laying according to a definite system (Sections 3–9 in Chapter I of Rice and

[6] Practical Poultry Management. John Wiley & Sons.

Botsford's "Practical Poultry Management"), and similar manipulative activities are cases in point. Specific directions for performing the work should then be provided, in order that the pupil may gain the necessary form. If such directions appear in suitable form in the literature available to the pupils, it is suggested that references be used. If directions are not to be found, an important step is to provide the direction at this point in the content organization. Frequently it is helpful to indicate certain related information that will enable the pupil to perform the work more intelligently. Such information, being of the nature of managerial content, makes the form of the operation appear reasonable and explains the principles involved in the performance of a given piece of work. The column headings, "Operations," "Guiding practice," and "Related information," will be found helpful in working out an organization. These columns are illustrated on page 143.

(*b*) Each farm job of the management type should be broken up into the important decisions which it involves. For instance, in the job of feeding dairy cows for winter milk production, it is necessary to decide what feeds to use, what mixing to do, and what schedule to follow. From a study of these problems, one may prepare a list of the factors which must be taken into account in reaching the conclusion. Because of the importance of the economic aspects of agriculture, *cost* factors have chief significance in all such decisions. A listing of the technical and related knowledge that will guide the pupil in an intelligent evaluation of the factors, and lead to a final conclusion regarding what he proposes to do should then be made. The outline of decisions to be made, factors, and technical and related information, shown on page 141, illustrates this point.[7]

[7] To A. P. Williams belongs credit for much original work in analyzing content in terms of operative and managerial objectives. See Bul. 103 of the Federal Board for Vocational Education, "Methods of Teaching as Applied to Vocational Education in Agriculture."

In summary, the preparation of an orderly organization for the course includes the analysis of each job into its opera-

PARTIAL OUTLINE OF MANAGERIAL CONTENT

DAIRY CATTLE ENTERPRISE

Decisions	*Factors*	*Technical and Related Information*
Decide on number of cows to keep	Available pasture Competing crop enterprises Available land for increasing feed crops Building facilities Market for products Costs of animals Available capital Available labor	Local types of farming Topography and climate Distance to market Forms of product demanded by market Hauling facilities Status of enterprise in community — increasing or decreasing, returns above cost, influence and status of coöperatives
Decide on breed to keep	Form of product for sale Adaptability of dairy breeds to owner's purpose Relative costs of breeds Advantages of purebreds and grades Availability of cattle	Breeds in the community Relative importance of breeds in the community Desirability of considering breeds not in the community Demands of market for different products Market for surplus stock Characteristics of dairy breeds Prices of animals available in the community Sources of supply of cattle for community

PARTIAL OUTLINE OF MANAGERIAL CONTENT—*Continued*

DAIRY CATTLE ENTERPRISE—*Continued*

Decisions	*Factors*	*Technical and Related Information*
Decide what ration to feed	Roughage on hand Available feeds Costs of nutrients Physical characteristics of feeds Palatability Adaptability	Characteristics and value of roughage feeds Rations used by successful dairymen in the region Meaning of terms used in balancing rations Nutritive requirements of dairy cattle Characteristics, composition and feeding effects of leading dairy feeds Local prices of feeds—mixed feeds, separate feeds Relation of variety to palatability and physical nature of ration
Decide on feeding schedule to follow	Amount and kind of feed needed Time milk must be at the station Farmer's other duties Efficient use of labor Special needs of animals	Feed requirements of individual animals Importance of regularity in the schedule Schedules used by successful dairymen Train schedule and station regulations Local enterprises conducted and seasonal duties Labor employed and efficient use of men's time

PARTIAL OUTLINE OF MANAGERIAL CONTENT—*Continued*

DAIRY CATTLE ENTERPRISE—*Continued*

Decisions	*Factors*	*Technical and Related Information*
		Schedule requirements of different animals regarding frequency of feeding, order of ingredients and amounts of roughage and grain
Decide what records to keep	Character of the business regarding type of animals, products to be marketed and plan of breeding Value of various types of records	Importance of record keeping Advantages of accurate records Systems of records for different purposes Time required to keep and evaluate records Financial value of records

PARTIAL OUTLINE OF OPERATIVE CONTENT

DAIRY CATTLE ENTERPRISE

Operations	*Guiding Practice*
Balance the ration	Ladd, Dairy Farming Projects, pp. 70–77 Yapp and Nevens, Dairy Cattle, pp. 141–142
Procure feeds for the ration	Ladd, Dairy Farming Projects, pp. 69–87 Yapp and Nevens, Dairy Cattle, pp. 131–140
Feed the animals	Yapp and Nevens, Dairy Cattle, pp. 145–159
Take the inventory	
Keep milk records	How to Keep an Account with the Dairy, Cornell Ext. Bul.
Keep feed records	
Keep breeding records	Ladd, Dairy Farming Projects, pp. 55–68
Keep labor records	Yapp and Nevens, Dairy Cattle, pp. 302–315
Keep cash records	

tive content or its managerial content or into both types, as the need for training may indicate. The content on page 141 and the illustrations found in the Federal Board Bulletin 103 represent merely cross sections of the kind of organization which should comprise the final course organization. As suggested at the outset of this chapter, the course of study must represent the teacher's individual and accumulative knowledge and experience. He alone understands the individual needs of pupils, and the local agricultural conditions and practices; he is familiar with his own limitations and is therefore the one who is responsible in the last analysis for the final selection and organization of content. Scarcely any type of effort is productive of such large returns in self-stimulation and improvement, and in meeting the needs of pupils through efficient instruction, as that spent in a systematic and critical evaluation of course content as here proposed.

ORGANIZING PART-TIME, EVENING, AND SPECIAL-SCHOOL COURSES

For the most part, the suggestions for course building just presented are applicable to all types of courses. In the case of part-time, evening, and special-school courses, adjustments and adaptations will need to be made (*a*) to suit the special needs and aptitudes of the group, (*b*) to take account of the limited time, and (*c*) to take account of the nature and scope of the content in the non-vocational units.

The "unit" basis of organizing vocational content for part-time and evening-school groups is so universally accepted that little emphasis need be placed upon it here. Under such an organization, teachers usually consider the choice of content in a limited field of production or management, such as feeding cattle for winter milk production, repairing and operating gas engines, or keeping cost accounts. The value of such an organization resides in the concentration of effort on a limited group of farm jobs which bear an important

relationship to the efficient management of enterprises or to the conduct of particular types of work.

It appears at present that a major difficulty in the better instruction of the part-time group is the marked individual differences among class members. Where pupils possess the ability to interpret simple directions for study and work, the "job instruction sheet" has been found a valuable device in meeting this situation. These sheets may be prepared by individual teachers or by groups of teachers working in regions of similar types of farming. The sheet shown on this page represents the organization of the course in one job of the management of the farm with respect to layout. The function of such a unit instruction sheet is to guide the pupil in his study and activities, thus enabling the teacher to distribute his time and energy among a larger group of

JOB INSTRUCTION SHEET

UNIT. Managing the Farm.
LESSON. Planning the Farm Layout

Make an outline map of your home farm like those on pages 350, 351 and 354 of Cornell Extension Bulletin 55, How to Plan the Farm Layout. Use the kinds of lines shown on the inside of the cover of Bulletin 55 and show on your maps fields in grain and other crops, orchard, pasture, wood lots, swamps, fences, hedges, roads, railroads, lanes, ditches, creeks, farmstead and location of buildings. For purposes of this study you will be able to draw a map on a paper about 9″ x 11″, with sufficient accuracy to gain the important parts of this lesson. The things of most importance are the distances along the sides of the fields, and the shape and size of the fields.

To obtain these distances you can pace them off fairly accurately if you are careful or you can use an "A" walker. An "A" walker may be made by nailing three sticks together in the shape of an A with the points spaced 5½ feet apart. Three steps of this walker will equal one rod. After you get the knack of using this walker you can measure distances almost as fast as you can walk.

On the map of the farm which you have made, letter each of the fields, a, b, c, etc., and in your notebook put the letters in one column, the dimensions of the field in feet or rods in the second column and the size of the field in acres in the third column. There are 43,560 square feet or 160 square rods in an acre and therefore if you have

the dimensions you may easily figure the acreage. If the field is shaped like a rectangle, that is, with corners that are square or nearly so, multiply the length by the breadth, and divide by the number of square feet or square rods, whichever you are using, in an acre.

If the field is three-sided in shape multiply the length of the lower side by the shortest distance that this side is from the top angle of the field opposite. This number divided by 2 will give you the number of square feet or square rods in the field.

The area of irregular shaped fields can be gotten nearly enough, by laying them off in rectangles and triangles and computing the areas of these parts as shown above.

Read page 347, Cornell Extension Bulletin 55, "Why Many New York Farms Need Re-arranging."

After reading this section do you think your farm is well arranged? Are the fields the right shape to work most efficiently? Is the farm laid out so that labor saving machinery can be used to advantage?

Read pages 348–369 in Bulletin 55. On these pages seven conditions which influence the farm layout are considered. These conditions are: Size of fields, shape of fields, distance to fields, obstructions in fields, fences, use of land, lanes and driveways and the farmstead. Consider carefully each one of these conditions. Write in your notebook under the following headings your answers to the questions.

Size of Fields

Are any fields on your farm too small to work well with large machinery?

Are any fields badly cut up by stone rows or fences?

Why are large fields more economical of labor than small ones?

Why is it more important to have a field larger with a three horse team than with a one mule team?

Why does a small field require more turning?

Why is the size of field less important in mowing than in other farm operations?

Note in Table I, page 348, that as the fields increase in width and length fewer man hours and horse hours are required to plow an acre. Explain this in your notebook.

Why do five fields of equal size make a five-year rotation easier than five fields unequal in size?

Is your farm cut up as badly as figure 130, page 350?

On your farm what crop fields can be combined best so as to make four or five fields of about equal size?

What crops do you need to grow on your farm and about what acreages?

Can these be worked out so as to be grown in a four, five or six-year rotation?

How would you do this?

Shape of Fields

Why is more time needed to do farm work on fields that are irregular in shape, that is, triangular or the sides not parallel?

For usual farm operations why is the oblong field best?

Why is the shape more important in smaller than in larger fields?

Why are crops like hay, better suited to irregular fields than cultivated crops like cabbage and potatoes?

How does the number of corner posts in an irregular field increase the cost of fencing?

Why is a square field the most economical shape for a pasture?

Are you prevented from changing the shape by wet spots, hills, woods, or bad soil?

What fields on your farm are irregular?

What caused them to be irregular?

Are there any wet spots, hills, orchard or woods that caused these fields to be laid out irregularly?

Can the wet spots be drained?

Are the orchard or woods valuable enough to leave?

Which of these irregular fields of your farm can be combined readily with others so as to make them more regular?

Distance to Fields

Why is it better to keep the fields nearest the farmstead in intensive or tilled crops?

Why are long narrow farms expensive to operate?

Why is a highway running through the center of the farm an advantage?

Are all of your crop fields readily accessible from your farmstead?

In the table at the bottom of page 353, note the number of man trips and horse trips necessary to take to the acre to grow and harvest various crops.

If the entrance to a 10-acre field is ¼ of a mile from the barn, about how far would a man and team travel in a year in growing silage corn?

Are any of your crop fields located with their entrances not easily accessible?

How could you cut down on the distances from the barn to any of your crop fields?

Obstructions in Fields

How do trees, stone piles, open ditches and swamps waste a farmer's time?

Are there any obstructions on your farm that it would pay to remove?

List these obstructions and tell what would have to be done to remove them.

Fences

Why do fences around crop fields waste land?

How many rods of fence are required to enclose a square field of one acre?

How many rods of fence are required to enclose a square field of 40 acres?

Note in table II, page 349, that as the size of fields is increased fewer rods of fence are required per acre. Use diagrams in explaining this in your notebook.

If a fence row prevents use of land for five feet each side, how much land will be wasted along 50 rods of fence? Note in table II that the per cent of land wasted in fences decreases as the size of fields increase. Explain this in your notebook.

Are there any stone rows on your farm that waste land with weeds and brush like the picture in figure 139?

Calculate the amount of land that is wasted around the fences on your farm. Do this for each field and list the land wasted in your notebook.

Is all of this waste necessary? How much could be saved? Which of your crop fields would be just as well without being fenced?

Compare the pictures in figure 140 and figure 141 as to the land wasted, also the land saved by the fencing in figures 142 and 143.

Lanes and Driveways

How much land will a lane 1 rod wide and 80 rods long require?

What are the advantages of the lane on a dairy farm?

Is your pasture for milking cows connected by a lane with your farmstead?

Could such a lane be constructed and not cut up any of your fields?

Would such a lane be of any help to you in making the entrances to any of your crop fields nearer to the barn and more easily reached?

Farmstead

What is the best arrangement for the location of a farmstead?

Draw a sketch in your notebook of an economical arrangement of buildings for a farmstead, on a dairy farm.

Make a sketch of the buildings on your farm.

Study the farm plans on pages 369–377. Note how these farmers have actually replanned their farms in order to do their work more efficiently and how they have put into practice the facts and principles that you have studied in this lesson.

Plan a new layout for your own farm putting into effect as many of these principles as you can. The plan you should put up should be the ideal toward which you will work over a period of time.

Tell the changes which it will be necessary to make and the approximate order in which you plan to make them. Also figure what the cost of making each change planned will be and check this against any possible saving of land or labor. Every change planned if it is a wise change *should* effect *some* saving of land or labor that will pay for the change.

pupils. Also, such sheets allow individual pupils to progress as rapidly as they are able. A disadvantage in the use of job instruction sheets is found in the fact that frequently part-time students are interested primarily in manipulative activities and incidentally have poor study habits.

Available time is obviously a limiting factor in the content that may appear in a part-time course unit. One of the most ideal plans, for organizing a part-time curriculum and subsequent courses, that have been available to the authors is the one adopted at Pontiac, Illinois.[8] At this school a part-time group attend regularly for a period of six weeks during the winter when farm work is least pressing. The curriculum includes crop enterprises and soil management, animal enterprises, farm organization and management, rural civics, farm arithmetic and practical English. Doubtless many similar courses are being given throughout the country. These present excellent school practice, since both the vocational and the non-vocational aspects of the curriculum are emphasized.

[8] Pontiac Township High School, Bul. 1, Pontiac, Ill.

TABLE XXXVIII

Instruction Outline for Agricultural Evening Classes

Statement of job	Problems of group	Experiences of group in solving problems	Information for which instructor is responsible	Summary of information	Follow-up (supervised practice)
Selecting seed corn.	What type of ear to select.	Types selected and reasons.	Ideal type (exhibit good sample).	Summary of information supplied, with emphasis on points constituting good type.	Assist members of class in selecting or securing good seed corn.
	When to plant to get corn to mature.	Approximate date on which members of class usually plant. Results as to maturity in each case.		Summary of dates and results. From this information help class to draw conclusions as to best dates to plant.	Before planting time, visit farmers and emphasize importance of date of planting.
Preparation		Presentation			Application and testing

A key-factor in preparing courses of study for an evening-class group is the adequate evaluation of the experience and problems of the group, since this group is composed primarily of adult practicing farmers. Foard, specialist in agricultural evening classes, State of Colorado, has suggested a type of organization of courses for such a group which, experience seems to indicate, is a simple and effective method of organizing content. See Table XXXVIII.

An important criterion in organizing content in the non-vocational units is the recognition of some sort of *doing* activity. The following plan of organization, prepared and used by teachers in New York State, is illustrative of this criterion.

BUSINESS PRACTICE CONTENT

Banking

- Opening accounts
- Following banking rules
- Negotiating loans
- Securing a mortgage
- Discounting notes
- Calculating interest

Merchandizing

- Measuring hay
  - grain
  - lumber
  - silage
  - wood
- Letter writing
- Advertising
- Contracting for sale
  - In advance of crop
  - At time of harvest
- Pooling products
- Selling F.O.B.
- Selling to commission men
- Selling direct in public market
- Determining freight rates
  - express charges
  - postage rates

Assuming citizenship responsibilities
- Determining assessment valuations
- Calculating taxes
  - State
  - Town and county
  - School
- Preparing leases
- Repairing roads
- Securing title to land
- Preparing a deed
- Taking insurance
- Supporting public offices
- Accepting public office

GENERAL INFORMATION

The place of job-analysis.—"Job-analysis" is an aid in selecting content, and not a method of teaching. Confusion appears to exist in the minds of many teachers with respect to its real use. In brief, its chief rôle is to guide the teacher in determining "what to teach." It shows the scope and types of content involved in a given job.

"The mind's most frequent intellectual act is to connect one thing with another," writes Thorndike,[9] "but its highest performance is to think a thing apart into its elements. Dissociation or analysis furnishes the data for the advanced types of human thinking and action." Thus, analysis, when applied to the problem of selecting content, is the act of resolving requisite vocational activities into their elements. The steps of determining types of farming enterprises, farm jobs, and their component knowledges and skills, previously discussed, illustrate this type of thinking.

To make an analysis of a job, one must have personal experience in the job itself or must utilize the experience of others now engaged in performing it. One's own experience may consist in an immediate participation in the job or in a review of one's past experiences. It is relatively easy to

[9] Thorndike, E. L., Principles of Teaching, 133.

watch a person at work and to make a list of his physical experiences or motions. Such a procedure, however, does not constitute a true analysis, because no account is taken of the planning and thinking which precede or accompany the work. Workers, when questioned regarding their activities, either in person or by questionnaire, fall short of including all of the duties they perform or all of the information necessary to the successful and intelligent performance of their work.

One phase of job analysis to which considerable attention must be paid is the inventory of the main difficulties which workers encounter in the vocation. In the selection of content, these difficulties, which may be either operative or managerial in character, constitute a sound basis of emphasis in teaching. It is usually not hard to secure from workmen a sizable list of their difficulties and problems, because these are likely to be uppermost in their minds. Closely associated with this phase of job analysis is that of the comparative difficulty which workers experience in performing various jobs. Accurate inventories of such difficulties, gained from workmen themselves, are a valuable aid in selecting teaching content.

Habit-formation.—It is apparent that the building up of habit mechanisms is an important objective in teaching agriculture, since both efficient operation and efficient management must depend upon well-wrought habits. Job-analysis not only reveals what elements are involved, but also shows how the elements are made to function It is reasonable to look for a method which is most economical in the expenditure of energy and sufficiently effective in performance to secure vocational sanction. Emphasis upon the formation of routine habits is a basic consideration in laying out a program of study in vocational agriculture. Furthermore, accuracy in the formation of habits is the basis of economical training in skills. The attitudes that are to be developed and the knowledge that is to be imparted rest fundamentally upon the development of associations with which habit-for-

mation deals. The teacher's big task is to "put together what should go together and keep apart what should not go together."[10]

Motor activity.—The expression, "learning by doing," is particularly applicable in teaching a vocation. The objective, "shearing a sheep," can not be reached without *shearing.* It is a matter of *doing.* The farmer is constantly dealing with countless *things.* He must manipulate tools, machines, engines; he must handle poultry, stock, and crops. The actual performance of the task is the best means of making its difficulties conspicuous, and therefore is the basis of a better-controlled performance later on. The activities of the individual are indices of whatever learning is taking place. Provision for activity is essential in making up a course of study, since providing opportunity for activity involves a more generous allotment of time. Teachers of agriculture can hardly expect to succeed unless they teach more and more in terms of the activities of the vocation.

The emphasis placed upon habit-formation and motor activity is not incompatible with mental training, for the point of view of such emphasis is that mental training comes from the utilization of self-expressions, whether free or controlled. Accuracy of ideas depends to a large degree upon controlled experience. It happens that in the vocations the ideas are related more closely to tangible things and are therefore more easily evaluated in terms of function. The skilled workman must express himself in the manipulation of tools and materials, and his self-expression is revealed in his products, which elicit our admiration. Until he has formed the habit by which his dexterous movements are made, he follows a pattern. The pattern relates to what he does in his modification of movement, but what he can do determines what he will think about the pattern. In acquiring a satisfactory form, the pupil must be interested; he must have directions at least sufficient to suggest the form of movement. The lat-

[10] Thorndike, E. L., Educational Psychology, Vol. II, p. 20.

ter is suggested in copy or demonstration. The skill comes only with practice. The organization of the content of instruction in a course must embrace the need for self-expressive activities.

Thinking.—It is important to recognize that purpose in education is being realized when the individual is profiting by experience. The individual may well associate *thinking* with such improvement in *doing*, if thinking is to have significance, for thinking is essentially the attaching of meanings to experience. It is evident, therefore, that our thinking is very intricate, ranging, as Dearborn [11] suggests, all the way from reverie, the kind of thinking we do in "day-dreaming," to reflective and creative thinking. This paragraph is intended as a caution against the all-too-common assumption that vocational work does not involve any high forms of thinking. On the contrary, the teacher of agriculture has the control of teaching situations which, on the whole, furnish completeness of setting for genuine thinking hardly equalled in any teaching position. Plans for the control of these "settings" involve adjustments in the construction of curricula and courses.

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[11] Dearborn, N. H., Introduction to Teaching, D. Appleton, 1925.

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CHAPTER VII

RECOGNIZING METHOD

Courses of study, as previously considered, suggest, first of all, the content from which selection will be made in order to accomplish the aims that we expect to realize in teaching particular pupils in a given time and place. The principles that control the selection of content for courses of study likewise determine the methods by which that content is organized for purposes of instruction and by which teaching is conducted. In analyzing farming into specific types, into farm enterprises, and into their component jobs, do we find the sources of this content. When content is evaluated in terms of the immediate needs of individual pupils, or in terms of the needs of clearly differentiated groups of pupils, problems of method appear. Method is the *way* in which the *organization* and *teaching procedure* appear in utilizing this content to meet specific pupil needs. This constitutes the third aspect of the course of study, which has already been defined.

Content and method are thus inseparably connected. In planning teaching procedure, it is well to regard method as a way of acting. Its significance, therefore, consists entirely in its providing advantageous ways of proceeding toward desired goals. The teacher of agriculture, since he is dealing with vocational situations, must hold and emphasize this view of instruction if his method is to function in practice. The more the distinction between content and method is emphasized, the greater is the tendency to digress from the vital problems of the vocation and to emphasize general or disciplinary purposes as the more important. Even job-analysis if

carried to extremes, will tend to divert attention from vocational purposes. After determining the objectives to be accomplished by the instruction, analyzing the content of instruction is the *next* step in the determination of method. The *third* is choosing among the specific devices at the teacher's disposal for accomplishing the respective ends. It is at this point that the teacher must evaluate, utilize and improve the specific forms of teaching, such as discussion, laboratory, and supervised study.

The following steps are basic in the development of method:

1. Determining instructional purposes.
2. Evaluating the learner's experience.
3. Selecting what is to be taught.
4. Making an orderly arrangement of the content.
5. Teaching the lesson.
6. Checking the results.

In order to make these steps explicit, the following cases are presented as illustrations in point. Each case suggests its own content, a certain amount of which is to be taught. The organization of the content for each case is a problem of method.

Case 1. Shall I be a dairyman? This case is taken from Yapp and Nevens' "Dairy Cattle," Chapter I, and may be outlined as follows:

Determinations	*Factors*	*Technical and Related Information*
Advantages of the industry	Cow as producer of human food. Conservation of soil fertility. Consumption of roughages, etc. Marketing farm products. Marketing farm labor. Cash income.	See Text, pp. 4–10. See p. 15 for special references.

Determinations	*Factors*	*Technical and Related Information*
Disadvantages of the industry	Length of working hours. Difficulty of securing efficient labor. Capital required. Loss through diseases.	See Text, pp. 10–12. See p. 15 for special references.
Characteristics of a good dairyman	Attitude toward cattle. Attitude toward type of work. Capacity for detail. Disappointments.	Text pp. 13–15. See p. 15 for special references.

Case 2. Feeding dairy cattle in winter. See Chapter VI, pp. 140–142, under outline of Operative and Managerial Content, Dairy-cattle Enterprise, for an outline.

Case 3. Planning the farm layout:

Decisions	*Factors*	*Technical and General Information*
Is rearrangement necessary?	Type of farming. Shape of fields. Distance of farmstead from fields. Kind and condition of fences. Location and convenience of lanes and drives. Best use of land for types of farming. Cropping system.	See Cornell Extension Bul. 55. Warren, "Farm Management," Chapter XIII, "How to Plan the Farm Layout," Chapter XIV, Cropping systems.
What changes to make	Continuance or change in type of farming. Costs. Use of machinery—present layout versus possible changes in necessary labor.	Same references as above.

Decisions	*Factors*	*Technical and General Information*
Drafting the changes and planning the work	Available labor—yearly and seasonal. Time of year. Other farm layouts. Machinery and dynamite needed. Utilization of materials saved in other parts of the farm business.	Same references as above.

Case 4. Soldering holes in tin. Adapted from Robb and Behrends' "Farm Engineering," Chapter IV. This is a case where operative jobs dominate.

Operations	*Factors*	*Technical and General Information*
Clean the tin	Oxidation. Dirt. Grease.	Text, pp. 164, 165, 183.
Apply flux	Prevention of oxidation. Time.	Text, pp. 164, 185-187.
Heat the soldering copper	Kind of fire. Degree of heat. Tests.	Text, p. 183.
Apply the solder with a heated soldering copper	Attraction for solder. Heating of the copper. Manipulation of the copper. Amount of solder.	Text, pp. 164, 168, 184, 185.

1. Determining instructional purposes.—Purpose is the aim which is to be realized through instruction. It is the universal expression of self-active individuals. It centers the learner's attention upon the goal to be achieved and creates in his mind a readiness to react against the difficulties that appear. It supplies, therefore, the point of reference for

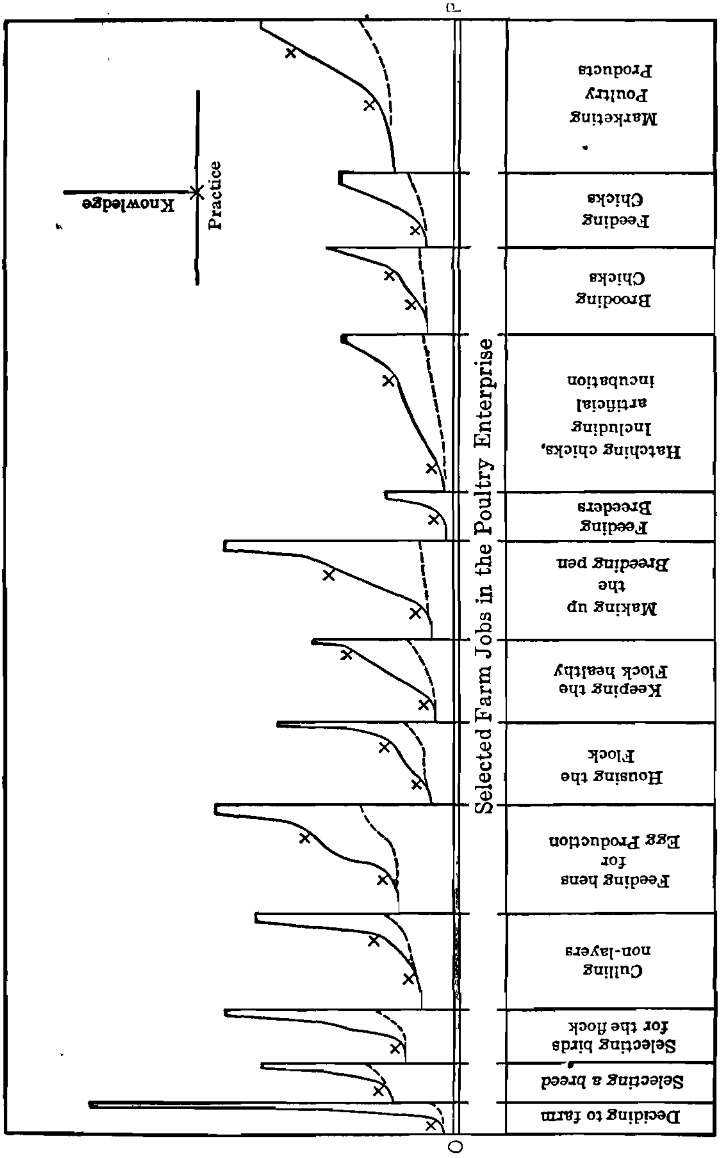

FIG. 7.—Suggested relationship of Practice, Knowledge, Decision.

evaluating and selecting subject matter appropriate to the course of instruction.

Teaching purposes in vocational agriculture vary from the comprehensive general statements of occupational choices, expressed in the determination of the answers to questions, such as, "Shall I be a farmer?" to business decisions in conducting enterprises or in conducting the business as a whole, made in answer to questions arising from enterprise or business, such as, "Shall I hatch chicks by the artificial method?" or, "Shall I keep poultry?" Teaching purposes also include the specific purposes of the jobs, larger or smaller, such as operating an incubator or adjusting the thermostat. The greater the fund of experience possessed by the learner, the greater the possible use of technical and related information in the program of instruction; the less the fund of experience, the greater the necessity of emphasizing a program of operative lessons with a relatively small proportion of technical and related information.[1] This relationship, which is described briefly in the following paragraphs, is suggested in Fig. 7.

The list of selected jobs considered in this hypothetical figure is tentative only. The figure is designed to show schematically the relationships of practice, knowledge, and decision in the program of instruction. The horizontal line indicates practice; the vertical line, knowledge; and X, the point in practice where decision is involved if the practice is to be raised to greater efficiency, and where, therefore, the practice is maintained on a more intelligent basis. The width of any column, say, the first, "Deciding to farm," suggests the relative importance of practical experience in that job in comparison with the other jobs indicated. For example, in teaching "Feeding for egg production," practical experience is almost four times as important as in "Deciding to

[1] See the discussion of inductive and deductive lessons in any good text in method, and note the appropriateness of the deductive method, to learners possessed of particular experience and of the inductive method to learners who must gain experience.

farm." The relative heights of the columns indicate the relative amounts of knowledge which it may be practicable to use to raise the level of practice and to assist in making the decisions involved in the improved practice. For example, in teaching "Deciding to farm," on account of the limited experience of the learner, reliance must be placed largely on knowledge; but in teaching "Hatching chicks," knowledge requirements are relatively low because of the large amount of practice involved.

The dotted line, beginning at the level of experience already obtained before entering training, indicates the improvement which may well be expected if no school instruction in poultry farming is given, but if practice in the vocation is continued. In this case the acquisition and use of knowledge would result from the "pick-up" method of learning. The relative width of any given column, say, "Culling non-layers," as we press from the base line, O-P, into the field of knowledge acquired during the period of instruction, indicates the relative possibility of applying such knowledge economically to the performance of the job. It is a practical problem in making a course of study to maintain a reasonable balance, in the light of the expressed purpose, between the practical and theoretical aspects of any job-problem.

It will be noted that where the purposes express decisions to be made, rather than specific tasks to be done, there is a greater demand for technical and general information. When the job involves difficulties that may be met only by familiarity with specific knowledge content, the teacher may well direct the learner's attention to the experiences of others. The more complex the performance of a given task becomes, the greater will be the emphasis upon the particular skills which the practice requires, and the less will be the emphasis upon knowledge. Analysis of the job into its component elements furnishes the basis of economical practice. Frequently the task can be performed best by the use of tools. These, in themselves, may be of varying degrees of complexity, and

their use may therefore involve both technical knowledge and skill. The lesson on soldering suggests this point in the heating of the soldering copper.

These levels, or types, of purpose embodied in the foregoing cases are elaborated briefly here:

Case 1, "To discover the advantages and disadvantages of the dairy business with a view to engaging or not engaging in it"; represents a comprehensive purpose-level. Case 2, shown on page 160, "To feed dairy cattle for winter milk production," represents a purpose-level contributory to the above comprehensive level; *if* the individual decides to enter the business. "To determine what ration to feed," "To determine a schedule of feeding," "to balance the ration," "to procure the feed," and "to feed the animals" are the more specific purposes which must be realized before the contributing purpose, "to feed dairy cattle for winter milk production," can be achieved.

Case 3, "To plan the farm layout," represents a managerial purpose-level involving the consideration of certain factors and the technical knowledge necessary to give proper evaluation to these factors. Case 4, "To solder a hole in a tin utensil," represents the operative purpose-level. In this case the prime factor is manipulative dexterity in handling materials and tools, supported by a limited amount of technical information. It is clear, therefore, that these various purposes serve to focus the learner's attention upon the respective goals of accomplishment and to delimit the field of his learning.[2]

2. Evaluating the learner's experience.—On whatever purpose-level the teacher may be working, he must first determine the accumulated experience of the learner as one essential factor in his teaching procedure. To do this he must consider the pupil's age, the type and extent of his farm

[2] The reader should guard against assuming that the relative amount of teaching time given to any unit represents the actual value of the unit in the enterprise itself. See p. 129 for criteria.

experience, and his abilities and attitudes. Referring to the feeding of dairy cattle for winter milk production, answers to such questions as the following will assist the teacher in determining the experience of the pupil, which may have been gained in previous lessons, on the home farm, or elsewhere:

(*a*) What progress has the pupil made in school?
(*b*) What has been the type of his farming experience?
(*c*) What is his attitude toward the dairy business?
(*d*) What experience has he had in feeding cattle?
(*e*) What responsibility has he had in determining rations? Has he been responsible for balancing rations, feeding stock, mixing feed, and buying feed?

Every new learning situation in which the pupil finds himself, puts his previous learning to the test, in so far as his previously acquired knowledge, skill, and attitudes can be utilized. Thus a thorough-going inventory of the pupil's experience constitutes an essential step in method. It is here that we recognize the theory of apperception which has been discussed so fully in most earlier texts involving methods.[3]

3. Selecting what is to be taught.—Before a purpose can be realized, certain difficulties must be overcome. These difficulties arise out of the pupil's inability to make satisfactory decisions, to perform tasks skillfully, or to discover resources which contribute to these ends. In teaching, these difficulties are regarded as problems, and make instruction necessary. Teaching content, which has accumulated through the experiences of those active in the fields in which the problems arise, and which will make it possible for the pupil to solve these problems, constitutes in general *what* is to be utilized in teaching.

Assuming, for example, that the pupils have had little or no experience in feeding dairy cattle for the winter produc-

[3] F. E. Bolton, in his "Principles of Education" (Chas. Scribner's Sons), p. 526, says that apperception "comprises the whole process of evaluation and assimilation." His Chapter XX is full of suggestions applicable to this aspect of all mental processes.

tion of milk, and that it is proposed to obtain such experience, the following and other problems present themselves:

(*a*) What is the best ration to feed under certain set conditions?
(*b*) What is the best feeding schedule to follow?
(*c*) What is the best method of balancing the ration?
(*d*) Is it advisable to buy mixed rather than separate feeds?
(*e*) What is the economical mixture in mixing feeds?
(*f*) What constitutes sound practice in purchasing feeds?

In the case of soldering a hole in a tin utensil, certain relevant problems arise in such questions as the following:

(*a*) Why is it necessary to clean the tin?
(*b*) What is a flux and what are its uses?
(*c*) When should the flux be applied? Why?
(*d*) How is the soldering copper heated?
(*e*) How do you determine when the copper is properly heated?
(*f*) How do you manipulate the copper?
(*g*) How much solder should be used?

Such problems define the scope of the content needed to accomplish the purpose. The more involved the purpose, the greater is the number of problems and the greater the scope of the content needed. The selection and organization of this material is further elaborated in the following paragraph and in Chapter VIII on "Planning the Lesson."

4. Making an orderly arrangement of the content.—This step includes an arrangement of the problems of instruction, and is essentially the basis of lesson planning. In making a lesson plan, the previous experience of the learner is an important factor in determining which problems shall be presented first and which ones may advantageously be postponed. Another important factor is the possible value of any given problem as a preparation for some other problem

in the series, or as a contribution thereto. For example, under a normal program of instruction, the questions, "What is flux?" and "How is it used?" would usually be answered before practice in soldering was given. A third factor is a recognition of those problems that involve technical difficulties. These ordinarily should come later in the series.

At this point, it is important for the teacher to grasp the use of the term *lesson*. It has already been stated in this volume that the farm job furnishes a sound basis for the selection of content for instruction. Therefore, the farm job constitutes the unit of lesson organization. The purpose of the farm job provides the purpose of the lesson, sets the problems, and limits teacher and pupil activity. Because of the significance of lesson planning in method, the next chapter is devoted entirely to a consideration of this subject.

5. Teaching the lesson.—The school, or department, of agriculture is designed to provide teaching situations. It is important, therefore, that the teaching situations provided be in keeping with the objectives, the learner's experience, and the available materials of instruction, and that the arrangement of these materials be such as to provoke desirable responses. Teaching is hard to define. Jacotot's "To teach is to cause to learn," may be interpreted into latter-day terms if it is understood that causing to learn means setting the situations so that the individual responds in keeping with the purposes of the exercise. Teaching is only part of the process; learning is the other. The two constitute a give-and-take process, since both the teacher and the learner are modifiable agents within the process. Since both personalities engaged in the process are flexible, changing, and striving, the genuine process of teaching or of learning is never mechanical, but rather is a continuous readjustment made in the light of the conditions. Good teaching involves the setting of the situations so that the optimum effects of all factors involved are realized. Considered from this point of view, skillful teaching becomes a fine art.

6. Checking the results.—How well the purpose has been accomplished is always a vital consideration for the teacher. He may check his instruction in at least three significant points: (*a*) Did the pupils solve the problems which were set up as a basis of realizing the purpose? That is, can they solder a hole in a tin utensil? Do they know what the best feeding schedule is for the conditions set? (*b*) Can they utilize the attitudes, knowledge, and skill thus gained in attacking new problems? (*c*) Most important of all, can they and do they utilize these in making decisions and in performing specific tasks on the farm under specific conditions of time and place? Do they solder holes in tin utensils? Do they follow a feeding schedule? In other words, does what they gain function in practice? Specific attention will be given to the problems of measuring results in Chapter XV.

Summary.—It has been the purpose in this chapter to show the complementary relationship of content and method in instruction. The four cases cited were taken to show how on different purpose-levels the principal steps in methods appear. If the teacher (*a*) makes clear to himself and his pupils the purposes involved in this teaching, (*b*) evaluates the learner's experience in the light of these purposes, (*c*) selects what is to be taught in the light of teaching purposes and pupil experience, (*d*) arranges his material in an order most appropriate for learning, (*e*) sets up the teaching situation and conducts the teaching in the light of the best knowledge of learning processes, and (*f*) checks the results against the purposes which he set out to realize, the significance of method and its principal functions will stand in relief.

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This means that subject matter is regarded as valuable in that it satisfies needs and aids in the solution of problems. The viewpoint of the book is well illustrated in the common school subjects.

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CHAPTER VIII

PLANNING THE LESSON

The specific lesson derives its significance for life from its integral connection with the purpose of the enterprise, with the purpose of the course of study for a specific year, and with the curriculum of the school. In the preceding chapter, it was pointed out definitely that the farm job is without doubt the most logical unit of instruction and that, since this is so, its purpose determines the purpose of the lesson.

Lesson planning includes a systematic organization of teaching content, the determination of methods and devices for teaching, and an orderly checking of results. There are many forms and interpretations of lesson plans, and these have been presented from time to time in educational literature.[1] This chapter is confined to a statement of the steps that are essential in the construction of a plan of teaching. The use and interpretation of the plan can be effective only insofar as the teacher can adjust forms to the demand of the teaching situation. A good lesson plan is flexible.

At this point the student is urged to supplement the text and to vary the applications of the steps presented to meet the varying conditions of teaching situations. The lesson plan is no substitute for the resourcefulness of the teacher, for it must always be constructed with reference to the needs of the learner and the facilities of the teacher. Frequently, two or more steps may be combined; in other cases, additional steps may be helpful. In every case, the purpose of the course of study must be pivotal, for undue emphasis upon subject matter alone in a plan will defeat the purposes of instruction.

[1] See bibliography at the end of this chapter.

Seven phases or steps in the making of a lesson plan are suggested:

1. Stating the purpose and the chief problem.
2. Analyzing the problem.
3. Determining the unifying factors, or pivotal questions.
4. Determining the most effective approach.
5. Selecting the most appropriate forms of teaching.
6. Providing "set-up" of the teaching situation.
7. Choosing a means of testing pupil achievement.

Step 1 provides for the connection of the new lesson with the previous lessons in the series and prepares the way for the advance. Steps 1 and 2 are essential as a basis of understanding what is involved in the advance. Step 4, in connection with Step 1, is a recognition of the principle of apperception. Steps 5 and 6 involve the presentation of the advance and point to evaluation and meanings. Step 7 implies the test of application. To assist the teacher in discovering and evaluating these steps, the following cases are presented. They show the steps in varying degrees of definiteness and suggest that the main value of the lesson plan lies in the specific preparation it exacts of the teacher. The analysis of other lesson plans will be helpful in discovering essential steps.[2]

A Teaching Plan

Case 1, dealing with corn cultivation, includes seventeen steps:[3]

Step 1. Obtain and tabulate the experience of the class in cultivating corn.

Questions as to past experience. Tabulate on board.

1. How many have cultivated corn?
2. Were one or two-horse cultivators used?

[2] See Colvin's "An Introduction to High School Teaching," pp. 236–51, for a statement of essentials.

[3] This is a detailed plan taken from the November, 1925, *Visitor*, published by the Division of Agricultural Education, University of Minnesota, and was prepared by Professor F. W. Lathrop. In this number, two other types of lesson plans, on the same problem are presented.

3. What kind of attachments do you have at home?
4. How many have cultivated with the cultivator set too deep? What happened?
5. Do your neighbors differ as to the time of cultivating? As to kind of cultivator used? As to number of cultivations?
6. What are the reasons for cultivating given by parents?

Step 2. Develop by questioning the desirability of getting the maximum results per hour spent in cultivating projects.

Questions concerning corn projects.

1. How much do the hours per acre spent in cultivating vary on different farms? (Study completed project records or other cost-account sources.)
2. May you spend too much time cultivating your project corn?
3. How could the cost of cultivating corn be reduced to a minimum?
4. Is it worth while to study methods of cultivating corn most effectively?

Step 3. Develop the pivotal questions:

A. What questions shall we have to answer in order to arrive at the principles of cultivating corn?

B. Draw from the class the following pivotal questions and possibly others. Pivotal questions in the right-hand column. In the left-hand column are questions which may bring out pivotal questions, if they are not forthcoming.

a. How do you know your father's reason is the correct one?	1. What are the purposes of cultivating, and which one is most important?
b. How do we know when to begin cultivating?	2. Under what conditions should we use a harrow or weeder on a planted corn field?
c. Did you use the same kind of cultivator throughout the season?	3. What kind of cultivator should we select?
d. Did you always use the same attachments?	4. What cultivator attachments should we select?
e. Is it possible in a general way to plan your corn cultivation?	5. How determine the depth and time of each cultivation? Make a schedule for your home farm or project.
f. Teacher adds this question.	6. What is Montgomery's advice on corn cultivation?

Step 4. Tell class where to look for pivotal questions.

Question 1. Wallace and Bressman, p. 52.
Question 2. Cox, p. 226.
Question 3. Farm machinery catalogs.
Question 4. Montgomery, Corn Crops, pp. 197–202.
Question 5. Montgomery, Productive Farm Crops, Chapter X.
Question 6. Montgomery, Productive Farm Crops, p. 79.

Step 5. Explain principle of capillarity.

(*a*) Use lump and fine sugar with red ink.

Step 6. Direct study of the class.

Step 7. (After pupil preparation). Place data from the Kansas experiment on board and call on boys to interpret. (See Wallace and Bressman.)

Step 8. Call for topical discussion of Pivotal Question 1.

Step 9. Call for topical discussion of Pivotal Question 2.

Step 10. Have three boys tell which cultivator they would select from the catalogs, and why?

Step 11. Call for topical discussion of Pivotal Question 3.

Step 12. Have boy answer Pivotal Question 4 and refer to the attachments borrowed from the hardware store. Class may question boy.

Step 13. Have two or three boys present their cultivation schedules and defend them before the class.

Step 14. Call for topical discussion of Pivotal Question 5.

Step 15. Call for topical discussion of Pivotal Question 6.

Step 16. Ask boy to summarize principles. Place in brief form on board.

Step 17. Ask class if objective has been reached. If not, clear up difficulties.

A Descriptive Plan

Case 2 is a descriptive plan prepared by R. L. Hahn[4] as a trial practice in following the Type IV outline as described in Bulletin No. 103, Agricultural Series No. 25, pages 25-27.[5]

[4] Teacher of Agriculture at Willimantic, Connecticut.

[5] Methods of Teaching as Applied to Vocational Education in agriculture. Issued by the Federal Board for Vocational Education, Washington, D. C. Three other type plans are presented in this bulletin. This bulletin was prepared by Mr. A. P. Williams, Federal Agent.

LESSON PLAN

Enterprise.—Keeping poultry for egg production.
Farm Job.—Keeping records and accounts.
Objective.—Managerial ability.

1. Preparation:

   The teaching base:

   1. Some farm records and accounts are not worth the time it takes to keep them, which eventually leads farmers to discontinue the records.
   2. Adequate farm poultry accounts of a really valuable nature need not consume over ten to fifteen minutes a day for keeping the necessary records, but through faulty arrangements frequently take more time.
   3. Hardly any two businesses or farm enterprises of a similar nature will need exactly the same records, but should make their accounting systems fit their needs.
   4. Sloppy or inaccurate records in bookkeeping would get a firm's contracts and business all tangled and probably encourage petty thievery among the workers. As a result accuracy is watched even to a penny or mill. But a farmer keeping cost accounts for himself isn't likely to steal from or try to deceive himself. Since his reason for keeping records and the conditions under which they are kept are different, he will have to set his own standards of how the work ought to be done.

   Methods.—Discussion with problem used for illustration.

2. Presentation:

   Methods.—Guiding questions to develop the important decisions and factors in the job.
   Demonstration of making decisions for Rosebrooks Farm.

3. Supervision of Practice:

   Methods.—Exercise in making decisions for Storrs Farm poultry. Propose plans for same with justification for them.

4. Testing:

   Methods.—Plans for records on poultry project in its second year.

5. Time Allotment:

   Two days.

ANALYSIS OF MANAGERIAL TRAINING CONTENT

1. Decision—Where to keep the records:
   Factors—Kind of records
      Safety
      Permanency
      Accessibility
      Cost
      Size of business

   Kind of information for applying, factors
      Convenience to work to be recorded.
      Danger from fire, misplacement, destruction.
      Filing facilities in the home, barn or coop.
      Suitable facilities for convenient record keeping.
      Community practice.

2. Decision—When to make entries:
   Factors—Kind of record.
      Accuracy
      Availability of time
      Size of enterprise

   Kind of information for applying factors
      Accuracy of prompt and deferred entries compared.
      Appreciation of time wasted in confusion of items and failure to remember.
      Daily work and living schedule.
      Frequency and detail of various records to be kept.
      Community or approved practice.

3. Decision—What standards of neatness and system to set:
   Factors—Kind of record
      Accuracy
      Size of enterprise
      Personal ability
      Margin of profit probable

   Kind of information needed for applying factors—
      Amount of error permissible without affecting the adequacy of the records for purpose kept.
      Previous experience in keeping such records.
         Other records.

4. Decision—What records to keep. (Managerial consideration of this decision will be reserved until students have kept at least a year's records, since their inexperience would make a poor basis for dealing with it interestingly.)

APPENDIX

Chronological Record (Sample)

OCTOBER, 1923

l. Inventory 15 Barred Rock yearling hens @ $1.00 each; 23 B. Rock pullets @ $1.50 each; 11 B. Rock cockerels 6 lbs. each @ 30c. per lb.; eggs on hand 5½ doz. @ 50c. doz.
Bought 100 lbs. Lay or Bust Mash @ $2.80, 100 lbs. cracked corn @ $2.10, 100 lbs. mixed grain @ $2.75; sold 9 culls for $9.20 (1) (2)
}. Sold 2 doz. eggs at 55c., ½ doz. at 55c. doz., ½ doz. at 55c. doz. (8)
t. Sold 2 doz. eggs at 55c. (4) (3)
i. Sold ½ doz. eggs at 50c. doz.; cleaning drop ½ hr. (4) (4) (4) (4)
). Sold 2 doz. eggs at 60c. doz. (6) (4)
:. Sold ½ doz. eggs at 60c. doz. (4)
}. Cleaning drop ½ hr. (5) (5)
i. Sold 1 doz. at 60c. (4) (5)
'. Sold 1 doz. at 63c. (5) (3) (2)
). Cleaning drop ½ hr. (5) (3) (3) (3)
:. Sold ½ doz. at 90c. doz. (5)
i. Sold 1 doz. at 80c. (4) (6)
'. Bought 100 lbs. Wirthmore Scratch at $2.65, 90 lbs. oats at $1.80; cleaning drops ½ hr. (0) (6) (2) (4) (5) (3 Nov. 1).

Chores for October average 10 minutes per day.
Leave blank line after last October entry in each record, and on the ›xt below it enter first November item.
Numbers in parenthesis are of eggs gathered. More than one number parentheses for a day indicates numbers gathered on successive lendar dates.

NOVEMBER

Have you left the blank line? Do it next.
November records include 29 birds (meaning hens and pullets) which ould be entered first, at head of November column on Egg Record.
Cleaning drops ½ hr. (5) (3) (4) (3) (4) (4)
Bought 100 lbs. Wirthmore Scratch $2.65. (5) (3) Etc.

Case 3, hatching chicks, is a job in the enterprise of raising ›ultry for egg production.

A DESCRIPTIVE PLAN

1. *Purpose:* To train the pupil to control the processes of incubation in accordance with efficiency standards.

2. *Analysis of training content by tentative jobs:*

    1. Decide whether to use hens or the incubator.
    2. Decide how many birds are desired.
    3. Decide when to commence the hatch.
    4. Select hatching eggs.
    5. Care for hatching eggs.
    6. Decide whether to pedigree-hatch.
    7. Pedigree-hatching.
    8. Choose an incubator.
    9. Select an incubator cellar.
    10. Prepare the incubator.
    11. Regulate the incubator.
    12. Test (and adjust) thermostat.
    13. Care for the lamp.
    14. Disinfect the incubator.
    15. Disinfect eggs.
    16. Maintain proper temperature.
    17. Turn the eggs.
    18. Remove broken and infertiles from nest or incubator.
    19. Remove chicks at hatching time and harden off.
    20. Supply ventilation and moisture.
    21. Cool the eggs.
    22. Test the eggs.
    23. Select the hen.
    24. Make the nest.
    25. Set the hen.
    26. Feed the hen.
    27. Manage the hen.
    28. Operate the incubator.

3. *Select the unifying and organizing factors:* (Other factors may be added.)

    1. Deciding upon the means of hatching.
        Advantages and disadvantages of the natural method.
        Advantages and disadvantages of the artificial method.
        Practices and results.
        Pedigree-hatching.
        Artificial method better for the purpose.

2. Providing hatching eggs.
   Selecting—stock, size, shape, color.
   Caring for—gathering, washing, holding.
   Shipping—warming, turning.
   Disinfecting.

3. Selecting and operating the incubator.
   Choosing.
   Preparing.
   Selecting cellar.
   Regulating.
   Testing.
   Caring for lamp.
   Disinfecting.

4. Operating the incubator for the hatch.
   Maintaining proper temperature.
   Supplying ventilation and moisture.
   Turning eggs.
   Cooling eggs.
   Removing infertiles and dead embryos.
   Removing chicks at hatching time.

. *Determine most effective approach:*

1. Previous related study:
   Practices in poultry raising.
   Precocity in connection with principles of selection.
   Housing the breeding stock.
   Feeding breeders.
   Lights on breeders.
   Incubator records.
   Selecting and mating breeders.
   Principles applied in breeding.

2. Principal connection:
   Practical experience—with hens and incubators.
   Selecting hatching eggs—for stock.
   Disinfecting eggs—against disease.
   Incubator practice—from records.

3. Teaching procedure:
   Based upon the above connections.
   Based upon available teaching equipment.
   Based upon other motivating experiences.

5. *Select appropriate forms of teaching:* (Supplemented by practice at home.)[6]

1. Deciding upon the means of hatching:
   Farm studies for knowledge of community practices.
   Supervised study for printed helps.
   Discussion for exchange of exercise and recitation.

2. Providing hatching eggs:
   Practicum for practice.
   Supervised study for printed helps.
   Farm studies for knowledge of practices.

3. Selecting and operating incubator:
   Practicum for practice.
   Supervised study for printed recommendations.
   Farm studies for knowledge of practices.
   Laboratory for knowledge of incubator.

4. Operating the incubator:
   Supervised study for principles involved.
   Practicum for practice in control and handling eggs.
   Discussion for checking knowledge.

6. *Provide SET-UP of the teaching situation:*

1. Secure the right mechanical features:

   Books and bulletins:
   Rice and Botsford, Practical Poultry Management.
   Lippincott, Poultry Production.
   Catalogs of Incubators.
   Cornell Reading Course, Incubation, 156, Poultry Series.

   Incubators:
   Buckeye No. 2 and Prairie State; two additional available for study in local implement store.

   Time allotment.
   Four double periods and home practice.

[6] See Chapter IX and following chapters for detailed discussion of methods of teaching.

Miscellaneous:
- School-made candler.
- Incubator record forms.
- Hatchability curves.
- Other books and bulletins.

2. Provide for review of previously studied points for connection:
   - Breeding stock.
   - Housing breeding stock.
   - Precocity.
   - Incubator records.
   - Breeding principles.

3. Make the assignment:

   Outline for study of the advance lesson.[7]

LESSON ASSIGNMENT

Enterprise.—Poultry for egg production.
Job.—Hatching chicks by the artificial method.
Purpose.—To handle and control the processes of incubation in accordance with efficiency standards.

Factors involved:

(1)
(2) Details omitted to conserve space. (See pp. 178, 215.)
(3)
(4) Operate the incubator for the hatch. (One double period and special practice.)

   a. Review points of (1), (2) and (3) above for any items that are needed for the discussion of (4), such as, regulating the incubator.

   b. Supervised study on the following points:
   (Outline in notebook—main points.)

[7] In most schools or departments, the typewriter is a part of the regular equipment, and frequently some form of duplicating machine is available. Where possible, therefore, duplicated copies of the lesson assignment outline should be in the hands of pupils. Otherwise the blackboard should be used.

(a) Adequate ventilation and how it shall be **maintained.**
Rice and Botsford, pp. 315–317, 324.
Cornell Reading Course, pp. 347–349.
Lippincott, pp. 191–196.

(b) Requisite heat and how it shall be controlled.
Rice and Botsford, pp. 311–313, 321–322.
Cornell Reading Course, pp. 337–347.
Lippincott, pp. 188–190.

(c) Handling eggs.
Turning, cooling, testing, removing infertiles, etc.
Rice and Botsford, pp. 322–326.
Cornell Reading Course, pp. 348–358.
Lippincott, pp. 190, 197, 203, 204, 205.

c. Practicum on putting eggs in, turning, removing infertiles, etc., using two school incubators, each pupil putting in eggs.

d. Discussion for twenty-five minutes on controls for good hatch.

7. *Check results:*

Three types of checking are appropriate to the exercise dealing with operating the incubator for a good hatch:

(1) Twenty-five minute discussion involving recitation;
(2) Check on the practice with the incubator; and
(3) Review of notes taken on assigned readings.

The above cases are not cited as perfect specimens of lessons. They do illustrate, however, in one form or another, the essentials of a lesson. There are many kinds of lessons, for each of which appropriate plans should be made. There are pupils with particular needs, and it is to meet these needs that the teacher strives. The essentials of a lesson plan, though they appear in many forms and may be abridged, have been stated on page 172. These steps are elaborated here.

1. Stating the purpose and the chief problem.—Stating one's purpose clearly makes it a working hypothesis for the progress of learning on the part of the pupil and a means of stability on the part of the teacher. Even with the best

statement of the purpose by the teacher,—since this purpose necessarily involves new attitudes, new knowledge, and new skill,—there are frequently difficulties for the pupil. These difficulties, however, are the basis of the need for learning. The problem is the difficulty which, for the time being, interferes with the realization of the purpose. As the pupil proceeds in learning, as suggested in the assignment outline above, he attempts to adjust means to ends and to test out his methods of procedure. A careful study of the purposes presented in the three cases given shows how they are defined gradually as one proceeds to their realization, and this lends support to the authors' contention that the *stated* purpose is an economical means of directing instruction.

2. Analyzing the problem.—Analysis, which has already been mentioned as a factor in organizing content, is fundamental to good teaching. The purpose will remain vague and indefinite to the teacher if he fails to discover the essential elements in any job and the relationships of these elements to each other and to the purpose itself. The teacher should be concerned especially with any elements, or relationships of elements, that are particularly likely to interfere with teaching or learning. These interferences, or difficulties, are the problems which must be solved in order to realize the purpose. Therefore, to carry the analysis far enough to guarantee adequate insight, the teacher will utilize the experiences of those who are apt in performing such jobs, and will make such a first-hand analysis of the job as the significance of the problem warrants. The realization of some purposes involves, for the most part, the making of decisions; that of others involves manipulation. It is imperative that the interferences, or difficulties, which furnish the problems, be known, and analysis is the only means of discovering them.

Referring to Case 1, it is purposed to cultivate corn. The analysis of cultivating corn will show varying practices, due to different types of cultivators, to different adjustments of the cultivators, to different kinds of soils to be cultivated,

to different conditions of soils, to age and size of the plant, and to similar factors. If all the important factors are discovered in such an analysis, the organization of materials for instruction will assume a much more significant place in the procedure of teaching. Analysis in this case furnishes the basis of the good organization of the content of cultivating, for it brings to a focus the issues involved. This is observed also in each of the other cases given. Two points regarding analysis should be kept in mind in teaching this or any other lesson: (1) Analysis should be elaborate enough to prevent vagueness and indefiniteness; but (2) not so elaborate as to result in diffuseness and dissipation of energy.

3. Determining the unifying factors or pivotal questions. —Not every operation or decision involved in the performance of a job is pivotal; that is, these operations and decisions may vary widely in significance from the standpoint of the purpose to be accomplished. Testing the thermostat is relatively less important in the series given on page 178 than choosing an incubator or selecting hatching eggs. It is a part of the teacher's responsibility in planning his work, to evaluate this teaching content and to relate the less valuable to the more valuable in natural divisions. See Case 3, page 178, for an attempt to do this. The reader may think of a much better organization. At any rate, a few factors stand out as having a sufficient range of connections to embrace certain minor operations. In each of these factors, or pivotal questions, certain other factors and sub-pivotal questions tend to arrange themselves according to the functions they may normally be expected to fulfill.

Since content lends itself to a detailed analysis, the teacher must give consideration to at least four points in determining the number of such factors that may be used most profitably in lesson planning: (*a*) the ability of the pupil to focus attention upon the various factors in the series; (*b*) their logical relationships in the teaching content itself; (*c*) the availability of content for developing logical completeness in the

answer; and (*d*) the relative significance of the question in the development of the larger purposes of the course of study.

(*a*) It is rarely the case with high-school pupils that more than three or four main factors can be held in mind satisfactorily in one given instruction period. An exception might occur in a case where the pupils were highly motivated and there was an abundance of interest in the task. (*b*) The logical relationships which the analyzed content suggests determine the number of factors that may be regarded as pivotal. It is often a fault to include relatively incidental matters, or even to include all of the important phases among the pivotal factors, if by so doing the learner is led into discursiveness or digression. *Effective mental systems*[8] *are built up through the elaboration of a few main operations or decisions rather than through a large number of relatively unorganized problems.* (*c*) A question may be significant, but the materials for acting or deciding on it may be inadequate or unavailable. In this case such a factor may well be omitted from the list of pivotal questions on account of limited teaching facilities, even though it is intrinsically of great value to the vocation. (*d*) It is especially difficult for the inexperienced teacher to escape digression. The relative value of facts must be kept in mind, in order to prevent it. Then there are questions which are in dispute among research workers. These become enticing topics of discussion and tend to promote digression. It is sound pedagogical practice to eliminate, for the most part, materials not verified in practice and also all extraneous material that tends toward digression and discursiveness.

4. Determining the most effective approach.—Providing for the most appropriate approach to the new portion of the lesson has been called technically the preparation. In Case 1, Step 1 and most, if not all, of Step 2 are concerned with preparation. In Case 2, there is special provision in the outline for the preparation, under "The Teaching Base." In

[8] See any good discussion of the laws of learning.

Case 3, the fourth step in the lesson plan is, "Determine most effective approach."

The matter of approach or preparation is in most cases the crux of good teaching, since it represents the most variable factor in teaching procedure. Its variability is due to the relative instability of the other factors in the lesson. Its indispensability rests upon its performing a guiding function in the progress of the thought. It lays the foundation for the initial movement in the lesson. It anticipates difficulties in the movement and modifies the direction of movement when necessary. It constantly makes new approaches upon the basis of each increment of progress made in the teaching process. Last, and by no means least, it shuts off by-ways that lead to digression. The lesson plan itself is suggestive and relative only, and can not be made a substitute for versatility in classroom procedure. The initial approach and the movement in the lesson are basic to good teaching.

In Case 3, page 179, it was pointed out that the approach depends: (1) upon previous study which is related to the problem at hand (several topics are listed); (2) upon the factors which by their appropriateness make the principal connections with the points of the advance lesson; and (3) upon one's teaching procedure, which is related to pupil ability, teaching equipment, and ways of utilizing experience gained in previous lessons. It is of strategic importance that the teacher utilize the points in the preceding lessons that have carried greatest momentum in learning, provided these points can well be made pivotal in the new unit of instruction. This procedure is based upon a recognition of the principle of proceeding from the known to the less known. The instruction will also be likely to proceed from the concrete to the abstract and from the simple to the complex. The teacher is in a position to make a fairly accurate evaluation of class interest and can determine how far it is wise to go into the field of technical knowledge. He understands the community and should know how high a vocational level the pupils may

attain. He knows what facilities are available for teaching the lesson, and can make a fairly accurate evaluation of the lessons in the series, which are competing for allotment of time.

5. Selecting the most appropriate forms of teaching.—In setting up a plan of instruction, other things being equal, the teacher will seek to establish a teaching situation as nearly comparable as possible to the natural setting. It has already been stated that the high-school pupil is only a part-time farmer at best, and that therefore the conditions imposed by his school activities frequently prevent the use of the method most appropriate to the practice on the farm. For example, a field trip may be the best way to teach a certain lesson from the standpoint of the particular operations;[9] however, at the time, such a trip may require too great an expenditure of time and energy, if it is not entirely impossible. It should be the aim of the teacher to select, whenever possible, the form of presentation in keeping with the methods of learning in the vocation itself.

In the cases cited, the methods of presentation have been suggested. These methods include class discussion, directed or supervised study, question and answer, demonstration, telling, illustration, practicum, farm studies, field trip, and laboratory. The teacher should understand that this variety of methods for presentation has grown out of the experience of teachers who have been seeking the most appropriate ways of furnishing economical learning situations. In every lesson plan, the teacher can indicate, with relative accuracy and definiteness, the form or forms of teaching which he desires to use, and can determine the methods appropriate for the presentation of new materials. It is never necessary to leave this step to chance. Even when natural conditions interfere with the carrying out of the lesson as planned, as, for example, when a heavy rain interferes with a field trip, the resourceful teacher will be able to proceed with his work because he will

[9] See p. 294, Chapter XIII.

have fortified himself against such an emergency. The determination of the form of teaching overlaps the next step in the plan, since it provides for the method of procedure. Chapters XII–XIV are given to a discussion of these forms and methods.

6. Providing set-up of the teaching situation.—It is clear that the various decisions made by the teacher in laying out his plan,—stating purpose and problem, determining important factors in training content, determining the approach, and determining the form and methods of teaching—all suggest what the *set-up* will be. They limit the field under consideration and indicate the conditions that constitute the learning situation. The teacher still has great latitude for choice within the limitations of decisions already made.[10] This involves the following points (See Case 3): (*a*) providing the right mechanical features for the setting of the instruction; (*b*) assigning a period for the review and determining what shall be included in it; (*c*) providing for the assignment, as to when it shall be made and what it shall contain; (*d*) laying out the advance lesson in keeping with the assignment; and (*e*) providing for checking the results.

(*a*) *Providing the right mechanical features.*—This involves having necessary materials ready for use in the most economical arrangement. These materials will include books, charts, outlines, bulletins, equipment, and supplies. It would involve, according to Colvin, proper regard for the external conditions under which the work is to be done and the physical and mental conditions of the workers, as well as satisfactory methods of work.

(*b*) *Assigning a period for the review.*—This is, in fact,

[10] S. S. Colvin, in "An Introduction to High School Teaching," presents a chapter (VII) on eliminating waste in the classroom, which contains many excellent suggestions on the setting up of the teaching situation. S. C. Parker, in "Methods of Teaching in High Schools," also has an excellent chapter (III) on Economy in Classroom Management.

determining the approach. Its importance as a distinct step has already been indicated. This review is essentially a *review*.

(*c*) *Providing for the assignment.*—See Cases 1, 2, and 3 for a variety of assignments. They include the purpose to be realized, outlines of steps of procedure,—the principal factors, called pivotal questions, and general directions for going about the work. The assignment includes, in addition to the main factors concerned in realizing the purpose and solving the problem, specific directions as to what is to be done and what is to be studied; what, if anything, is to be included in the class notebook; what materials are to be used; what results may be expected; and what procedure will be followed in checking results. It is economical to have mimeographed or manifolded copies of the assignment to be placed in the hands of the pupils.

In making the assignment,[11] the teacher reveals his plan to his pupil, at least as far as its general features are concerned. In it he gives directions for study.[12] The making of the assignment is the setting up of guide posts along the new road to be traveled. The first, and likewise the most significant, guide post is the statement of the purpose and problem. If the purpose is definite and clear and the pupil is made aware of the problems that must be solved, he should not lose his way. The assignment will indicate specifically, where necessary, such aids as will keep the goal in sight and prevent waste of energy in fruitless "trial and error."

(*d*) *Laying out the advance lesson.*—The assignment includes the laying out of the advance lesson. It includes the main factors in which the preparation and discussion center, and suggests their order in the series. It also includes, under each factor, such further details as will facilitate the development of the solution, such as means and methods of procedure, technical and related information needed, and the operations

[11] See Colvin, pp. 236–251 for essentials.

[12] See Chapter XIV for a discussion of study.

that must be performed. It does not repeat details that the pupil should have gained from previous study, though it may contain suggestions of new applications. It does not contain suggestions so specific that the study period calls for no initiative on the part of the pupil. It gives the references for reading, sometimes by chapters and sections, sometimes by pages, depending upon the character of the material and the experience of the pupil.

(*e*) *Providing for checking results.*—This provision in the *set-up* of the lesson is of sufficient importance to warrant its being emphasized as a separate step. The teacher makes provision for checking results in each lesson. Part of the checking is incidental to teaching, and part is a definite plan which pupils understand.

7. Choosing a means of testing pupil achievement.—This is not only essential to good teaching but is also a safeguard against misunderstandings and disappointments. The teacher can not plan wisely if he does not take stock of his daily accomplishments in teaching. Checking results, though usually understood to mean measuring the progress of pupils, is also a measure of the teacher's accomplishment. Pupils should have daily training in separating non-essentials from essentials in dealing with the solution of problems, whether in the improvement of their decisions or in the refinement of their skills. Furthermore, the approach to the new lesson and to the main points in its development furnishes an opportunity to check previous learning. The plan, if it is clear cut, makes for orderliness in thinking, and this provides an economical way of checking results; at least it focuses attention upon reasonable checking points. Methods for measuring the results of teaching will be discussed in greater detail in Chapter XV.

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The author's Chapter XII, pp. 327–350, is a useful statement of the problem of organizing subject matter, planning teaching methods, and controlling the classroom procedures.

WAPLES, D., Procedures in High School Teaching (Macmillan).
A very practical book on teaching methods, Chapters IX and X, pp. 138–164, deal with lesson planning and lesson assigning.

WILSON, H. B., KYTE, G. C. and LULL, H. G., Modern Methods in Teaching (Silver Burdette and Company).
The authors present four steps which they consider essential as a basis of lesson-planning, Chapter XII, pp. 172–188; (1) a thorough knowledge, on the part of the teacher, of the individual pupils, with reference to their preparation for instruction; (2) the determination of the subject matter to be utilized; (3) the preliminary selection of procedures to be used; and (4) consultation with the class concerning the activities to be pursued.

CHAPTER IX

SELECTING METHODS OF TEACHING

Many forms and devices have been invented by educators in their attempts to make available methods more appropriate to the conditions under which learning must take place. Not infrequently, this multiplicity of methods leads to confusion, especially in the case of the inexperienced teacher. He tends to regard a newly accepted form or method as superseding, rather than supplementing, the older. The newer forms, such as the laboratory, the home project, supervised study, and the farm survey, were designed primarily to make possible a better setting for the teaching situation. To avoid confusion, this range of forms, new and old, must be evaluated by the teacher in the light of their appropriateness for specific purposes. This exacts of the teacher a careful study of forms and methods, (1) that better selection may be made, and (2) that no particular form or method may be exploited by being used indiscriminately simply because it is the latest device.[1]

The point of view here maintained is that the vocational purposes involved in the curriculum, the course of study, and the lessons determine the best available procedure of instruction. These vocational purposes are always to be considered, in the light of pupil needs, as furnishing genuine problematic situations.[2] This point of view localizes the emphasis upon the

[1] Both the laboratory and the project are illustrations of forms of teaching that have been misused by their friends. No one method should be regarded as *the sine qua non* of instruction.

[2] A problematic situation is a combination of factors, one or more of which for the time being interferes with the realization of the pur-

purpose to be realized and upon the means and methods of realizing that purpose; also, it makes the determination of content and methods of teaching a selective process. In this chapter, therefore, the question of selecting methods is raised. It is hoped that a brief analysis of the means and methods at the disposal of the teacher of agriculture will make possible a more discriminating selection. The teacher is not unlike the artist who, now taking a flat brush with many hairs, now a small and fine one, now this pigment and now that, now a combination of both, gives the appearance of life and reality to his painting, which is a beautiful expression of his idea. His choice of materials and his handling of them together give the measure of his skill as an artist. In this sense the teacher is also an artist.

There have been devised, from time to time, a great variety of ways in which the exigencies of teaching may be met. Some of these ways are broad in scope and are aimed at the control of the teaching situation as a whole. Others do not owe their significance to the measure of control which they exercise over the learning process or to their scope and frequency of application, but are merely ways of conducting particular activities incident to the learning process. The teacher should be alert to discern *the* method that furnishes the largest measure of control over the learning process consistent with the economical expenditure of energy, and also to utilize special ways of stimulating the learner to improve in specific directions.

Among the methods of teaching that may be used, the following are more or less familiar: lecture, recitation, laboratory, question and answer, demonstration, illustration, supervised study, field trip, practicum, survey, examination, socialized recitation, project, discussion, shop. Most of these have common elements; several, such as the recitation and question and answer methods, differ but slightly in practice. The

pose. The solution of the situation involves the discovery and control of the interfering factor. This requires the selection of an appropriate mode of procedure.

home project, the survey, supervised study, the laboratory, and the farm shop provide for a large measure of general control with a maximum opportunity for self-expression.

A combination of methods in a given teaching situation is more likely to be the prevailing practice of the superior teacher. The laboratory, to be well conducted, requires some *telling,* which is the basis of the lecture method. It always requires the use of questions and answers if it is conducted properly. Frequently, it requires illustration and demonstration. It furnishes one of the best illustrations of supervised study, and supplies an essential characteristic of the project, the field trip, the practicum, the survey, and the shop. The same becomes apparent when any other method is considered. Two practical questions arise, therefore, in making a choice of ways of providing for the advance experience: (1) what method or combination of methods, and (2) what special methods, or combination of special methods, may best be utilized to promote maximum efficiency?

To make clear what would be involved in such a selection of methods, the following cases are presented. They represent actual teaching problems and indicate the teacher's selection in each case.

Teaching Problem	*Methods Used*
Storing cabbage on the farm	Field trip to five farms A survey of practices Discussion (question and answer) (In project study for one boy)
Buying males for the poultry breeding pen	Supervised study (Project reports, bulletins, and one text) Practicum Discussion (In project study for four boys)
Deciding whether it is profitable to keep a neighborhood bull	Supervised study (bulletins) Field trip Survey of community practices Discussion (question and answer)

Teaching Problem	*Methods Used*
Selecting an incubator	Survey Field trips (two poultry farms, one implement dealer's) Supervised study (catalogs) Discussion
Improvement of corn seed	Supervised study (books and bulletins) Survey Field trips (five farms) to learn practices Discussion Laboratory (testing experiment) Discussion Lecture (supplementary)
Docking and castrating lambs	Laboratory (demonstration) Practicum Discussion
Keeping cows healthy	Supervised study (books and bulletins) Discussion Survey Discussion of practices Lecture (making assignment)
Registering purebred stock	Survey (field trip to Frank Jones') Discussion Lecture (summary) Supervised study (special pamphlets) Discussion
Testing soil for acidity	Laboratory Demonstration (in field) Practicum (in field) Discussion Practicum (in laboratory) Survey Discussion
Determining advantages and disadvantages of marketing wool through local marketing association	Survey Field trip (to learn practices) Supervised study (special reports) Discussion

Teaching Problem	*Methods Used*
Feeding the idle horse	Supervised study (textbook) Discussion Survey (class experience) Discussion
Determining cost of growing forage crops in Vinton	Survey (farm records, local reports) Field trip Desk work (computations) Discussion
Testing corn for germination	Laboratory Lecture (assignment) Supervised study Practicum (in laboratory) Discussion
Mixing fertilizers at Hibbard's	Practicum (laboratory) Desk work (computations) Discussions
Filing saw	Shop *Job instruction sheet* Practicum Discussion (incidental)
Organization of Farmers' Coöperative Associations	Survey (field trip to four associations) Discussion Lecture (summary)
Studying "Our soil"	Visual (set of slides from Agricultural College) Lecture (incidental)
Building hopper for hens	Shop Demonstration (of new points) Practicum

At least six points should be considered in making selections as illustrated in the above cases:

1. Approximating the procedure of learning as it occurs in natural settings.
2. Making a motivating approach.
3. Taking account of one's own preparation to teach.
4. Considering local facilities for teaching.
5. Noting allotment of time.
6. Taking account of non-vocational schedules.

1. Approximating the procedure of learning as it occurs in natural settings.—It is highly important that the teaching situation provided by the instructor approach the problematic situation as it occurs in the farming occupation. In order that pupils may learn to dock and castrate lambs, to buy males for the breeding pen, to select an incubator, to perform the Babcock test, or to test soil for acidity, it is necessary to establish conditions identical with those of the natural setting, or at least sufficiently similar to effect results in keeping with the vocational practices. The bases of sound decision and manipulative efficiency rest in actual contacts with things and conditions as they are.

2. Making a motivating approach.—In the preceding chapters, the importance of a fortunate approach has been emphasized. It may happen frequently that the situation, established in accordance with the natural setting, will not make a great appeal. Not all learning tasks, even in the vocation one chooses to enter, are interesting. This fact must be considered by the teacher who would launch instruction with the greatest momentum. A certain group of part-time pupils who expressed slight interest in the poultry enterprise became greatly interested after spending one afternoon on a high-class poultry farm where the owner first discussed the organization and management phases and then took up certain specific production problems. The teacher must be wise enough, especially when interest is at low ebb, to select a procedure that releases an abundance of energy for the learning tasks ahead. Frequently, the conscious alternation of the more exacting methods with the less exacting ones tends to promote the conditions of efficient learning.

3. Taking account of one's own preparation to teach.—It seems somewhat like compromise to suggest that the teacher select a method of teaching in keeping with his preparation, after urging the approximation of the natural setting and the making of the most motivating approach. Ordinarily, the teacher will be able to prepare himself to approximate the

natural settings; moreover, it happens frequently that procedures in keeping with his preparation may be substituted without doing great violence to the standards of his teaching, if energy and study are put into the situation. A teacher may guard against possible compromise in situations of this kind by refusing to accept a position in a community where the type or types of farming are relatively out of keeping with his preparation.

4. Considering local facilities for teaching.—It requires a great expenditure of time and energy to establish teaching situations on farms. On account of the non-vocational part of the curriculum which the regular high-school pupil is pursuing, not a little of the teaching, other than that of the projects, will be done at the school. The possibility of setting up a genuine situation in the school depends upon the available space, equipment, and supplies. In the placing of agricultural departments in high schools, a fundamental condition imposed upon local authorities is that they furnish, in connection with the school, adequate facilities for putting the agriculture on a vocational basis. Such facilities include at least two rooms and adequate space for putting the school instruction on a *doing* basis. It is important, therefore, that the teacher, in making his selection of teaching methods, have due regard for the school facilities available for teaching.

If a limited observation reveals the true situation in the country, too little use is made of farms for the setting up of teaching situations. Moreover, too little use is made of situations closely typical of the farm, which are easily accessible within a short distance of the school. Such situations are available in markets, implement stores, seed houses, and the like. If teachers would utilize these means to the fullest extent, the demand upon the school for special equipment and supplies could well be lessened. It is surprising how successfully the ingenious teacher can devise inexpensive ways of establishing genuine vocational situations at the school. The

relatively weak or indifferent teacher tends to the academic point of view, and thus in his hands, what passes for vocational agriculture has only incidental connection with successful farming.

It is well, therefore, to determine with care whether the teaching situation can or should be set up at the school or in some more natural setting outside. It is not always easy to determine this question; however, such jobs as are included in testing dairy products, candling and packing eggs for market, scoring seed corn, germinating seeds, grading wool, identifying varieties of apples, analyzing soil into its separates (if this were done), caponizing cockerels, may well be set up in the school without much, if any, loss. On the other hand, docking and castrating lambs, determining the location of the apple orchard, spraying for the coddling moth, pruning an old apple tree, selecting a cow for the dairy herd, culling a poultry flock, selecting seed potatoes from the field, involve teaching situations which only the natural settings of the vocation can furnish.

5. Noting allotment of time.—In making the course of study, one of the problems which presents itself is the allotment of time to the specific lessons. Most teachers have too little time for the individual lessons. This is due frequently to the failure of the teacher: (1) to allot time to the various jobs according to their relative importance and difficulty; and (2) to adhere closely enough to the allotment of time which has been made in advance. It is always conceded that teachers should be free to make adjustments within their courses of study during the year; however, these adjustments must take place within the total time available. It is necessary, therefore, in specific cases, that the teacher select methods of teaching in keeping with the relative maximum time at his disposal. Economy of time can be secured in many ways. A good illustration is given by Thorndike when he says, "It is not scientific to spend two hours in learning by manipu-

lation of instruments something which could be better learned in two minutes by thought."[4] The amount of time available sets the limits for the consideration of any job, and therefore determines what methods of presentation will serve best. An insufficient time allowance may even be an argument for the elimination of the lesson.

6. Taking account of non-vocational schedules.—Another source of interference with the establishment of teaching situations in natural settings is the non-vocational schedule of the pupil. Since the vocational classes meet for 90-minute periods, or for the half-day, the agricultural course, in almost all cases, has a chance for conflict with two or more non-vocational subjects. Added to this is the difficulty presented by repeaters and other irregular pupils. It happens frequently that the teacher has difficulty in securing a satisfactory schedule for his classes in agriculture. Instances of divided periods and other forms of class adjustment have appeared from time to time, making it practically impossible (1) to use home farms for instruction purposes, or (2) to make the best use of the longer period at the school.

The teacher is responsible for giving great care to the making of the class schedules, for this is his best opportunity to secure the conditions that are most favorable for planning lessons. When the schedule of periods has been made up, the teacher's freedom for determining teaching practices is limited largely by that schedule. Most teachers like the last two periods in the morning and the last two in the afternoon, or the vocational half-day, since such arrangements make it possible to leave the school for field studies without fear of encroaching upon the time of other teachers. Rarely should teachers of agriculture expect release of pupils from non-agricultural classes in order to extend the time of agricultural classes. When this is done, the fullest understanding should be had with the non-vocational teachers and reciprocation should not be considered out of place. The selection of

[4] Thorndike, E. L., Education, p. 178.

methods of teaching is limited, therefore, by the character of the schedule of the school. This schedule should be made as favorable as possible in order that the teacher may have the greatest freedom in the selection of ways of carrying on instruction, but it should always be in keeping with the good order of the school.

USING APPROPRIATE METHODS

Certain problems incidental to selecting ways of teaching have been presented in this chapter. Consideration of the characteristics of the more important ways, and suggestions for their use, will be given in succeeding chapters, which will deal with the following topics: conducting supervised farm practice, using the laboratory, making surveys of practices, conducting farm shop work, and handling the class recitation.

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CHAPTER X

DIRECTING SUPERVISED FARM EXPERIENCE

It has already been pointed out that participation in farming is an essential part of the process of learning to farm. Instruction in the school should follow or accompany experience on the farm. Whatever may have been the farm experience of the pupil before entering school, it is highly desirable that he (1) increase the scope of his farm experience, and (2) extend his skills in range and degree, according to relevancy of need and the types and standards of instruction. It is here implied that the primary purpose of organized instruction is to make the prospective farmer more competent to carry on farm enterprises and to enable him to perform more intelligently the jobs which these respective enterprises embrace. This means that we desire to have these young men *carry on* in keeping with scientific principles and according to the best practices. To accomplish this purpose, vocational training in agriculture must be secured by serious participation in the activities of the vocation, since out of this participation the facts and principles involved will emerge and be understood.

Clearly, therefore, it is the responsibility of the teacher of agriculture to provide situations in which pupils may participate in farming activities under normal conditions, and to supervise the learners while they are at work. Two features characterize the agricultural school which are found in scarcely any other type of vocational school:

First, practically all of the pupils come to the school with a background of considerable experience on farms, as indicated

in Table XII, page 68. One implication of this fact is that supervised practice for these pupils is essentially supplementary to the experience which they have already gained, and that, therefore, training in the business, managerial, and social phases becomes relatively more significant. Another implication is that of the necessity for special consideration of the problems of practice for village boys who enter with earnest vocational purposes.

Second, the school and the farms on which participation is to be provided are widely separated. The problem constantly before the vocational teacher is to connect the farm situations and problems with the classroom, field trip, demonstration, or practicum. This problem presents many perplexing difficulties, due primarily to the individual differences of pupils, the wide variations in home conditions, and the necessity for complete coöperation on the part of parents. The only true measure of effective vocational teaching is the ability of the pupil to *perform* the various activities successfully and intelligently. This is the crucial test of the teacher's ability to make the connections between practice and principle, between *doing* and *knowing.*

It must be remembered in this connection that even our regular pupils are only part-time farmers, and therefore they must farm and attend school at the same time if the new practical experience is to be made the basis of instruction. The farm supplies a rich source of materials and teaching situations. Not many vocations, if any, furnish a more abundant range of opportunities for practical experience than a typical modern farm; for on such a farm there are tasks and responsibilities suitable for children of all ages and comprising units of activity quite typical of the vocations. It is the business of the teacher to *determine how the supervised farm experience may be secured.*

In order to realize the ideal of vocational instruction, a program of supervised farm practice must be prepared for each pupil for each course and for the period during which he

intends to remain in school. For most types of farming such a program must include the plan for the development of (*a*) the skill and knowledge required to produce crops and animals and to perform farm repair and construction jobs incident thereto, and (*b*) the abilities needed to manage the individual enterprises and the business of the farm as a whole. The activities of the program must represent a complete round of experience in the specific vocation for which the pupil is preparing. The directed work of the pupil may take the following forms: (1) individual or group projects; (2) directed farm experience through routine farm employment; and (3) special studies of farm materials, the work of farmers, and the activities of persons with whom farmers deal. These three forms are discussed in this chapter. In the following chapter are included certain basic considerations in evaluating the home project as a device in teaching.

INDIVIDUAL AND GROUP PROJECTS

The home project has been a basic method of teaching vocational agriculture since the inception of vocational instruction in agriculture in the public schools. The abundance of available literature on the various phases of the home project makes it unnecessary to discuss them here. From the standpoint of the teacher, the vital problem is to organize the individual and group project activities of the pupils in such a way that good teaching situations are provided. In this chapter attention is focused primarily on this problem.

ILLUSTRATIONS OF HOME PROJECTS

Case 1.—A boy 15 years of age carried on a home project in poultry raising. He emphasized particularly the production of market and hatching eggs. The jobs which he had to carry out during his year's work were: selecting a breed and determining how many birds to keep, his flock of fifty-five single-combed White Leghorn hens being his answer; feeding,—first the hens for laying, then breeders, culls, and chicks,

finally, broilers and culls for market; housing,—first remodeling the poultry house in accordance with best practices, building nests and other equipment, brooder coops and pens; making up breeding pens; hatching chicks, both with hens and with incubator; brooding chicks; spraying poultry house and dusting birds; killing and marketing birds; marketing eggs, and doing numerous other important and incidental jobs. He raised 435 chicks, out of which he selected 170 fine pullets for his continuation[1] project. The flock of old hens, some of which were 5 years old, averaged about 139 eggs per bird for the year. The labor income on this project was $364.89.

Case 2.—Another pupil, also 15 years of age, grew an acre of potatoes as a part of his instruction in crop enterprises. He carried out the following jobs in connection with his acre potato project; selected a piece of soil adapted to raising potatoes; plowed the ground in the fall; arranged with a neighbor for certified seed of the Green Mountain variety; fertilized the soil with 250 lbs. 2-10-5 complete fertilizer; cultivated the soil thoroughly, using his father's tools for which he paid a reasonable sum; sprayed to control blight; harvested in October, storing a few potatoes but selling most of them on a good local market; and began an improvement project by selecting seed on the hill selection and tuber-unit method and working out a good rotation.

Case 3.—The following account of a successful poultry project reveals so many factors of genuine project activity that certain features are described at considerable length. Another 15-year-old pupil, rather frail in constitution, took over the home flock consisting of 146 White Leghorns, 60 hens, 80 pullets and 6 cockerels. An agreement was made with his parents for 20 per cent of the net profits as his share of the income. He completed his year on November 1 with an inventory of 44 hens, 105 pullets, 3 cockerels, a good brooder house, 8 x 12, built of second-hand lumber, and a balance on hand of $517.34 after allowing for expenses including 178 hours of self-labor at 20 cents per hour, 86 hours of man labor at 25 cents per hour, and 42 hours of horse labor at 25 cents per hour. An older brother had kept the record of the home flock of approximately the same size, the second year before with a net profit from 102 birds of $213. The average production for that year was 102 eggs per bird as against 127 for this project.

Case 4.—A 17-year-old boy lived in a section where sufficient income was derived from the dairy to justify classing the farming as of dairy type. Fortunately, this boy had raised a junior project purebred Holstein calf during the summer prior to his entering high school. His father has a herd of 18 Holstein grade cows. The year's course for

[1] See p. 214 for illustration of a long-time project.

his freshman year called for a poultry or dairy project, or an agreeable substitute. After a conference with his teacher and father and looking ahead to the series of projects for the four years, he decided to keep his six months' old calf, to raise another purebred Holstein calf, and also to grow some corn for feed. During the second year, he kept the two calves as minor to corn and potato projects of his second-year agriculture. When he came into the third-year class an inventory showed in his possession the following stock in the dairy enterprise: the original calf now a heifer 2½ years old, and a purebred heifer calf which this heifer dropped on August 18, a 2-year heifer, part of his first year project, bred and due to freshen in March of the current year. This young man was more fortunate in many ways than most high-school pupils in that he had the basis of a productive project on hand. Further, his father was willing to turn over to him the general management of the herd to which was added the son's two heifers and the two calves. In the management agreement the boy became responsible for the program of feeding and care, for keeping complete dairy herd records, weighing the milk according to an acceptable plan, testing each cow's milk for butter fat at the beginning and at least twice a month, scoring each cow and rating her in production, making such stable adjustments as seemed to be necessary, arranging for the profits on his own stock and his share of the work and profits involved in the whole herd.

This turned out to be a high-class type of project, combining a balance of production, management and labor aspects in a genuine vocational situation. Further, the boy came to the task prepared by means of varied experience with a good grade herd, with the more particular experiences involved in raising two calves which he himself owned, with the satisfaction of launching upon an improvement program in selecting purebred stock, and with, by no means least, the sympathetic support of his father. From his heifers he received a net labor income of $102.45 and $81.29 respectively; for his share from the herd, including payment for special labor, $312.25,—a total net income of $496.99.

Case 5.—Pupil, 16 years of age, second-year high school. Farm, 150 acres, 70 acres pasture, 10 acres woods, 65 acres crops, 5 acres farmstead and waste, 33 milking cows, 15 young stock, 300 hens, 11 hogs, 5 horses. Farm located in dairy region where milk is major source of income. Potatoes and cabbage are cash crops.

Arrangements: Pupil owned 3 cows as result of his dairy-calf project taken as a junior project for 2 years and a dairy heifer which had been developed as a minor project during his previous years. He was to pay his father rent for the use of the barn. Horse labor was to be

paid for at the rate of 30 cents per hour. Such man labor as was needed during the boy's absence at school to be paid for at 35 cents per hour.

Plans: "I have two purposes in my projects for this year. I want to save all the money I can to put in my fund for going to the Agricultural College and also I want to work with cows and crops to learn the most I can in my study of agriculture in the high school. To do this I have planned to keep my 3 cows, raise an acre of potatoes and ¼ acre of mangels. I saved my potato seed from my last year's project. Last year I learned a lot about potato growing which will help me raise this crop at a better profit.

"I will perform the following jobs in handling my cows and the crops."

(Jobs omitted here.)

Financial Summary: For the dairy project the total charges were $432.91 with the total credits, $671.54, making a net profit of $238.63. In this amount are 86 hours of self labor and 36 hours of horse labor together with $32.02 charges for the mangels. His net profit for his acre of potatoes was $169.42. The summary for the combined projects was a net profit of $408.05.

Case 6.—Pupil, 15 years of age, first-year high school. Physically handicapped. Farm 54 acres, 6 cows, 2 horses, 146 hens, orchard 4 acres, crops 18 acres, meadow and pasture, 32 acres. All products except milk sold at roadside market near large city.

Arrangements: Pupil was to have 20 per cent of profits on poultry as payment for his labor and management.

Plans: "By agreement I take over the care and management of the home flock beginning November 1. From our discussion in class and from suggestions given by the teacher when visiting my home, I have decided that there are certain things I can do to make our poultry flock more profitable. I plan to do the following: (1) improve the house and inside fixtures, according to the plans and specifications which I have drawn; (2) be more careful in the amount and kind of feed given the birds, feeding the ration for laying hens which we have worked out in class; (3) improve the flock by getting rid of the poor layers and by securing eggs from a good laying strain next spring and hatching them early so as to have early-laying pullets; (4) dispose of the cockerels before the price gets very low; (5) keep my house clean and well ventilated so as to prevent disease, also keep my hens free from lice and mites; (6) keep a record of all the expenses and receipts and work done so I will know at the end of the year exactly what profit I made, whether it will pay us to build another laying house and increase the size of our flock."

Labor and financial record:

Charges		*Credits*	
30 hens	$37.50	112 cockerels, 94 hens	$161.71
112 pullets	168.00	Eggs sold, 1430 doz.	636.35
13 roosters	13.00	Eggs used in home 121½ doz.	52.68
1 incubator	5.00	Manure	35.50
1 brooder	15.00	Inventory at end	
Feed on hand	7.50	108 pullets	162.00
100 chicks	15.00	44 hens	55.00
4067 lbs. grain	89.65	3 roosters	3.00
4313 lbs. mash	103.88	1 incubator	5.00
50 bushels mangels	12.00	2 brooder houses ($14 and $25)	39.00
Shells and grit	2.75		
½ ton straw	5.00		
Spray material and fuel	2.70		
Hatching eggs (480)	33.60		
Use of building and equipment	15.00		
Self Labor, 179 hrs. @ 20c.	35.80		
Man labor, 123 hrs. @ 30c.	36.90		
Horse labor, 29 hrs. @ 30c.	8.70		
Lumber	7.20		
Brooder house	12.00		
4 fowls dead	4.00		
Interest on average inventory	13.10		
Net profit	506.96		
Total	$1150.24		$1150.24

Summary and conclusion: "On November 1, 1920, I started with 30 hens, 112 pullets and 13 roosters. The roosters were sold off during the winter. Only 4 hens died during the year. During the second week in November father and I began to remodel the hen house. We put dropping boards under the roosts, a frame with wire netting under the perches, fixed up some decent nests on the side wall and put in a muslin opening for ventilation.

"I made a large mash hopper and drinking stand at school. These were placed in the house, also a dust box. I also cleaned the dropping board every Saturday. On November 20 we started hanging lanterns in the house.

"Instead of buying our scratch feed and mash, we mixed our own,

using the Cornell formula for each. I cut down on the amount of scratch fed in the morning and increased the evening feeding to about double the morning. In addition to the mangels I sprouted some oats. These were fed at noon. Towards spring we put a broody coop in the hen house to break broody hens. When warm weather came we let the hens out on free range.

"On March 20 we bought 240 hatching eggs. On Easter Sunday I candled them. There were 6 dead germs and 18 infertile.

"We built a brooder house 8 by 12 for the chicks.

"About the first of April we put up a crude burglar alarm. There were chicken thieves in the neighborhood. On the evening of April 10 the alarm rang. Father went back to the hen house and found a man there. He recognized him and ordered him away. He went, falling twice over the garden fence which he did not see. We haven't been bothered with thieves since.

"Our first hatch was not a success, only 112 chicks out of 240 eggs. There were two reasons: lack of moisture and pullet eggs. I argued with father about buying pullet eggs for hatching but because they were only $7 a hundred, while the hen eggs were $10, he told me to get the cheaper eggs. After this experience father was willing to let me get hen eggs for our second setting. This hatch came off on May 5 with better results, 158 chicks out of 240 eggs set.

"We were bothered a little with cats, but every cat we caught was disposed of.

"As the weather grew warmer we gradually turned off the artificial heat furnished by a coal stove, and let the chicks get used to cooler weather.

"One night it was a little too cool and diarrhea developed. Our chicks were inclined to be a little weak and it developed into coccidiosis. We lost a number of chicks but finally succeeded in checking the disease by keeping the house warm and feeding plenty of sour milk.

"We also altered the feed of the laying hens as warm weather came on, feeding less scratch grain and cutting down on the amount of corn.

"Our hens began moulting in June. We sold them off as fast as they moulted. We had only 44 hens left in November out of 142 laying birds started with at the beginning of the year. We also sold our cockerels as soon as they were ready. We put the 108 pullets that we had left in the laying house in October.

"Beside the experience I gained in taking care of the flock the past year, I have $101.61 as my share.

"I am planning to invest this money in a new 20 by 16 laying house and enough good hatching eggs to assure me chicks enough to fill the house next winter.

Case 7.—Pupil, 16 years of age, second-year high school. Farm, 155 acres, 55 acres pasture, 20 acres woods, 80 acres tillable, 26 milking cows, 12 young stock, 200 poultry, 9 hogs. Farm is a general dairy hill farm 5 miles from market (2 miles dirt road). Surrounding farms are not valuable and many are being abandoned. The owner (pupil's father) by hard work and careful planning and the assistance of his three sons, however, has made an average labor income for the past three years (1921–24) of $3530.

Arrangements: Projects of 1 acre of potatoes and 1 acre of cabbage. $10 per acre for rent of land. $22 for use of tools and horse labor. Labor to the value of these amounts was given by the pupil to his father in addition to the regular work of the farm.

Plans: "I expect to raise 1 acre of Danish cabbage and 1 acre of Russett potatoes. I will use special high-quality cabbage seed and certified potato seed. I expect to increase my knowledge of crop raising through the actual doing of the work, keeping of records, and putting into effect the methods and practices that I have learned during the school year. In selecting a high grade of seed I will try to prove their value, both as to yield and market, over the usual common seed used on the average farm. I will do all of the possible work myself, using additional help in such operations as cabbage setting and drawing. I will keep a complete record of all work done as well as a record of all money received and expended. I hope to make a profit of between $400 and $500.

"I will perform the following jobs:

Choose the ground
Select type of seed to be used
Purchase 12 bu. of potato seed
Purchase ½ lb. of Danish cabbage seed
Plow and fit the seed bed
Plow potato and cabbage land
Treat cabbage seed
Sow cabbage seed
Fit potato ground
Choose fertilizer
Cultivate and spray young cabbage plants
Treat potato seed
Cut potato seed
Mark potato land
Plant potatoes
Fit cabbage land
Set young plants

Cultivate cabbage and potatoes
Spray potatoes
Mark potato hills for seed
Dig potato seed
Dig main potato crop
Store potato crop
Select cabbage seed plants.
Store cabbage seed plants
Cut cabbage
Market cabbage and potatoes.''

***Labor** and financial record:*

Charges		*Credits*	
Potatoes			
12 bu. seed	$9.00	50 bu. sold for $125	$125.00
Freight	1.15	40 bu. on hand	70.00
½ ton fertilizer	16.00	19 bu. seed on hand	54.00
Rent of land	10.00		
Machinery, labor and horses	48.40		$249.00
	$84.55		
Cabbage			
Cabbage seed	$2.50	24,367 lbs. cabbage	$348.78
50 lbs. 4-8-4 fertilizer	1.63		
Tablets for seed treatment	.25		
½ ton 2-8-10 fertilizer	8.50		
Rent of land	10.00		
Machinery, labor and horses	56.50		
	$109.38		

Total project profits

Cabbage	$239.40
Potatoes	164.45
	$403.85

This pupil is continuing his potato and cabbage projects during the present year. As a result of his project experience, he is planning

to increase his potato-seed selection as a step in improving his yield and in producing a superior strain of certified seed.

Case 8.—Pupil 16 years of age, farm-reared. A 168-acre general crop farm in limestone region. Potatoes, cabbage, sweet corn and canning-factory peas are the dominant crops. The pupil chose to grow 2 acres of canning-factory peas in his project for second-year agriculture. By agreement he was to have complete control and management of the enterprise and to pay $12 per acre rent for the land. Horses and equipment were to be paid for at the rate of $5 and $3 per acre respectively. The following jobs are chosen from the pupil's notebook from the list of 26 jobs.

Preparing the ground: "My soil is a light clay loam. The field which I have chosen and which my father is to rent to me is on a slight rise of ground on a side hill. It is well drained. Corn was on the field last year. This crop had 2 tons of manure applied on it. I will plow the ground this fall, to get the benefit of winter weather. In the spring I will harrow the piece four times with a spring-tooth drag. If this does not pulverize the soil in a good condition I will roll it. I will roll the ground anyway after drilling the seed so as to give the seed plenty of moisture and so that it will germinate. This rolling will also help make harvesting easier."

Fertilizing the crop: "I will use 400 lbs. of acid phosphate (16 per cent). Most farmers around here, we find, use from 150 to 250 lbs. per acre. Experiments at the college show that on most limestone soils these amounts give the most money on the crop. I will not use manure because the ground was manured last year for corn and the experiment-station tests show me that about 30 per cent of the fertility hangs over (Cornell Bul. 95). Even though I am in a limestone region I am planning to use 1 ton of limestone on the 2 acres. About half the farmers we surveyed do this. Those who did got better yields. Peas are legumes. I know that legumes can not grow on a sour soil. Therefore I shall use limestone."

Planting: "I will plant 8 bu. of seed which will be furnished me by the canning factory. I will plant with a grain drill. I will apply the fertilizer to the grain drill at planting time. I will spread the limestone before and by broadcasting. I will be careful not to plant too deep because my soil is not heavy. The farmers say that shallow planting helps to prevent root rot. I will make a germination test of my seed to make sure that I will get a good stand. I will plant the last week in April or the first week in May unless it is too wet. Peas do best in cool weather. Most farmers get their seed in before May 10. I understand from the company that they want us to raise the late-

maturing varieties because better yields are assured and uniformity of peas is more likely.''

Case 9.—David Dunlap* began a four-year program of farm practice upon entering the department of agriculture. On the basis of the report of three years of this program the following summary has been prepared.

Supervised Practice	First Year		Second Year		Third Year	
	Celery	500 Baby Chicks	500 Baby Chicks	250 Pullets	270 Pullets	1500 Chicks
Size of project....	1⅓ acre	515.00	516.00	252.00	270.00	1572.00
Total production.	2150 thirds	464.00	476.00	2684½ doz.	3316 doz.	1376.00
Sales............	243.45	46.45	57.37	1255.82	1497.22	373.44
Closing inventory.	25.00	140.50	136.00	210.00	157.50	1067.00
Total receipts....	268.45	190.15	193.37	1465.82	1651.72	1440.44
Opening inventory	....	......	......	267.00	405.00	....
Labor...........	201.92	30.60	26.70	224.40	109.50	45.00
Feed and supplies.	14.78	52.17	102.36	474.04	666.21	536.48
Other expenses...	....	15.73	17.96	82.00	70.00	282.55
Total expense....	215.70	98.50	140.97	1047.44	1250.71	900.03
Net income......	52.75	91.65	46.40	418.38	401.01	540.41
Paid self for labor.	38.40	19.50	15.90	224.40	109.50	45.00
Labor income....	91.15	111.15	62.30	642.78	510.51	585.41

NOTE.—Fourth year, 670 pullets, 3000 chicks.

The supervised practice program undertaken by this pupil furnishes an excellent illustration of a long-term plan of organization in which the continuation project constitutes an important phase.

*Ohio.

In the foregoing illustrations, certain outstanding features of successful practical experience are conspicuous. They represent most of the main points or standards to be used in judging the results of project activities. To secure success in the supervised farm practice, questions of organization, of devel-

opment, of supervision, and of evaluation of results must be considered by the teacher.

The cases cited, though conforming to the general requirements of projects reveal certain distinctive features which it seems worth while to emphasize at this point. Cases 1 and 2 illustrate enterprise analysis which not only become an important basis of the project activities of the pupil, but also an essential basis for determining teaching content. In Case 3, the pupil took over an enterprise of the home farm on a strictly business basis. Case 4 is an excellent example of a long-time farm practice program beginning with the work of the junior project. The case also shows a plan of coöperative management between father and sons. Case 5 indicates how the project was arranged to dovetail with the farm business. The pupil's statement of the purposes to be accomplished is conspicuous. In Case 6, the labor and financial summary has been made particularly clear. The pupil evaluates the work of the project in a very creditable manner. The pupil in Case 7 shows how project plans may well embody the program of work to be accomplished.

Case 8 is included to show the pupil's analysis of the work to be done and how he proposes to (1) prepare the ground, (2) fertilize, and (3) plant the crop. In Case 9, where the long-time supervised practice program is organized we find an excellent illustration of a program of work involving the accumulation of vocational experience through continuation projects and the securing of capital to aid the pupil in increasing the scope of his business as basis of entering upon a profitable farm undertaking.

Among the outstanding responsibilities resting on the teacher, if satisfactory home projects are to be secured, are the following:

1. Assisting pupils in the selection of home projects.
2. Assisting pupils in the organization of the project plan.
3. Providing an adequate scheme of supervision.
4. Checking the results in terms of standards.

1. Assisting pupils in the selection of home projects.—As pointed out above, each vocational pupil must participate in supervised farm practice as an integral part of his vocational study in agriculture. Oftentimes he finds it difficult to meet the requirements of a proper project. Logically, he seeks the assistance of the teacher of agriculture, upon whom falls the responsibility of maintaining the standards of the vocational program in the community. There are two aspects of this program which must be met: the satisfaction of the vocational need involved; and the provision of a scheme of sound teaching practice. The teacher of agriculture, to insure the realization of these purposes, must accomplish the following ends in the selection of a project:

(*a*) Satisfy the pupil's personal needs.
(*b*) Provide for pupil participation.
(*c*) Promote an integrated program for the pupil.
(*d*) Accomplish a genuine vocational purpose.

(*a*) *Satisfy the pupil's personal needs.*—A project belongs to the person who plans and conducts it. A true project is characterized by individual purpose and plans which are translated into individual effort. This implies freedom to make and execute plans and responsibility in buying and selling. The pupil must accept the responsibilities as *his* opportunity to carry forward activities of real worth to *him*. He must establish his own objectives. He must try to see, in the light of whatever experience he has had, the probable lines of development in each of these. He must anticipate his own difficulties. He will secure suggestions from many sources, but he must be encouraged at every point to make his own decisions in the light of his particular conditions.

If the above conditions obtain, the pupil will have interest and enthusiasm for his project and will undertake the work with a specific purpose. He will also make specific arrangements to secure a reasonable degree of certainty in achieving his purpose. He will prepare a plan stating what he proposes

to do and how, where, when, and why he proposes to do it. He will execute the work and evaluate his experiences to the end that improvement in his ability in future undertakings may be assured. In fine, because the project is his, he will anticipate with eagerness and enthusiasm the new experiences which his choices and the development of the project activities afford.

(*b*) *Provide for pupil participation.*—The teacher, in order to stimulate interest as suggested above, must lay out a program in which pupil participation is fully recognized. The project should be under the managerial and financial control of the pupil, since it belongs to him and only through the translation of personal purpose and plans into managerial and operative effort can a genuine project be achieved.

The labor on a project should be performed by the pupil to the extent that physical or economic conditions permit, and in any case it should be under his management.

The project should be large enough to employ efficient production methods, to supply a desirable cash return, to involve an appreciable business risk, and to compete successfully, by reason of its importance, with other business and pleasurable activities of the pupil.

The pupil should record his project plans in sufficient detail to indicate adequate preparation and responsibility on his part for the work. He should have a memorandum of agreement with his teacher and parents so that there may be no question as to the share he is to have in the enterprise.

(*c*) *Promote an integrated program for the pupil.*—The teacher must lay out a plan for the projects in keeping with the agricultural curriculum of the school. He will integrate the supervised farm practice and the related subject matter studied by the class for the current year. If it is impossible to group pupils in such a way that the major and minor project interests are shared by the majority of the pupils, it is probable that radical readjustment is needed in the courses of study.

The project should extend through a complete natural cycle of production and business, since in no other way can all the problems of production and business be studied in their actual relations. The project should also be related to any projects that have been completed and to the projects proposed for subsequent years.

The project should be selected early in the year. Under ideal conditions, the pupil would select his project in advance of the opening of the year's work. This would facilitate the teacher's plan to utilize the project activities in the organization of the details of his instruction.

Projects should extend over several years. A continuation project provides facilities for teaching pupils to evaluate business decisions and for training them in operative jobs, and supplies an incentive to accurate accounting and recording. The continuation of projects, whether as major or minor, helps to give a cross-section of the training required for participation in the business. Good school procedure also requires that the projects be carefully analyzed and summarized when completed.

(*d*) *Accomplish a genuine vocational purpose.* It is not enough that projects satisfy personal interests, provide for individual participation, and satisfy the demands of sound learning practice. The pupil's project must also satisfy a genuine vocational need. Interest is a partial index of vocational need, since interest in a vocational activity is usually in direct proportion to the likelihood of financial gain, and to the obtaining of satisfactions in the knowledge and skill acquired in the accomplishments involved.

The projects should provide for wide representative vocational experience. They should be chosen, therefore, from the enterprises that are typical of the major activities of farmers.

The projects should be correlated with the business of the farm and with the type of farming that prevails in the community. This correlation constitutes a valuable means of making the instruction of the school check with the activities of

the specific vocation. It is on this account that the projects should extend through the complete natural cycle of production and business. As indicated above, the projects should be large enough to furnish the essential conditions typical of the successful enterprises of the community.

2. Assisting pupils in the organization of the project plan.—The successful launching of a project goes a long way toward its organization, at least as far as the larger purposes and anticipated problems are concerned.

(*a*) *The project plan and purpose.*—For best results, the pupil himself must be responsible for the plan. He should find no *set* plans made by the teacher for his work. On the other hand, he will have opportunity to discuss plans with the teacher and with the class, since the wise teacher will assist the class in a socialized-recitation type of discussion to the end that pupils may understand the essentials of the project plan. It is the wise teacher who knows when and how to keep out of the way of his pupils. Frequently he must use his ingenuity to guide class discussion in order that the pupil's decisions may be sound. He must steer them around certain dangers. He must accept the pupil-made plan and secure its modification by counsel, class discussion, and good example, so that when finally worked out it will not be lacking in any of the essentials of a good plan. The plans shown above illustrate the problem of organizing the project from the standpoint of good vocational practice and sound teaching procedure. In all the cases presented in this chapter under "Illustrations of Home Projects," clearly defined purposes appear. Each pupil has delimited his field of activity and has set up for himself specific goals for achievement.

The project plan is the organized expression of the pupil's purpose and of the procedures proposed for carrying out the activities involved. As such, it is the normal outgrowth of the analysis and of the interpretation of the enterprise activities appropriate to the course of which it is a basal part. Furthermore a good plan will be modified from time to time as the

requirements of the enterprise demand and the needs of the pupil indicate as he progresses through the natural cycle of production or management. A suggested procedure in the use of the project notebook follows. As a device for recording project plans see page 371 of the appendix.

(*b*) *The project agreement.*—Effective project selection could not go far without some sort of tentative agreement and understanding. This step makes possible the actual launching of the project. The agreement specifies the larger purposes, means, and methods involved in the undertaking, and points the way to a complete analysis of the project and the construction of the detailed plan. This agreement may vary in form from school to school and from state to state. Whatever form is used, provision should be made for explaining to the parent what the project is designed to do; how important it is to coöperate with the boy in the use of land, stock, labor and equipment; and what the nature of such coöperation is. It should also be made clear to the parent that the pupil should be permitted to manage his project and dispose of the fruits of his labor and management. The agreement may aid also in preventing embarrassing situations at later stages of the work. Mere formal agreements are unsatisfactory.

THREE FORMS OF AGREEMENT

The first form, called "Home Project Agreement," is a state form letter for teachers to follow. It partakes of the nature of a legal contract, though lacking legal form:

..................192......

This certifies that the parent of .... agrees to permit him to carry on a home project as hereinafter described in connection with the course in vocational agriculture at .... High School.

The *pupil* agrees to carry out faithfully the work of the project according to plans agreed upon mutually by the pupil, parent, and teacher; to record accurately all items of cost and income; and to make a final report of methods and results for the records of the school.

The *teacher* agrees to help the pupil in planning the project, in obtaining necessary information and other aid, to visit the pupil frequently to examine his work and suggest ways and means of improvement and to recommend, for school credit, work which has been conducted properly and has been completed.

The *parent* agrees to encourage the pupil by allowing the use of land, livestock, equipment, etc., as required by approved plans; to allow the pupil proper and sufficient time for conducting the project, to allow the pupil to assume financial responsibility and retain actual profit due for his work.

This agreement is signed in the presence of all three parties concerned.

Pupil ....
Teacher ....
Parent ....

The second form, called "The Home Project," was prepared by a teacher of agriculture as an aid in the work of his department. After being signed by the parent it is filed at the school, presumably following a conference:

The participation by all pupils in supervised agricultural practice is an essential part of vocational agricultural instruction. The school places emphasis on the fundamental principles, the best business methods, and the most successful practices of farming. To make the fullest use of the educational opportunities of the school, the home and the community, and to insure actual contact with practical work on the part of pupils, provision must be made for supervised farm work. This training in the practice of farming is accompanied by a home project which may be defined as a farming enterprise which is studied and planned at school under direction and carried into operation on the home farm or other farm where satisfactory arrangements are made under the supervision of the teacher of agriculture. It is not a series of problems relating to agriculture but is rather a definite piece of work in the conducting of which ownership, correct business methods, managerial responsibility, economic profit, and study are emphasized. An approved home project is necessary to the completion of each year's work in agriculture.

.... may have a .... project
(Name of boy) (Name of project)

The third form, called a "Memorandum of Understanding," is a letter prepared in triplicate, the original going to

the parent and the other copies to pupil and teacher. A specimen letter follows:

Pavilion, Illinois,
August 28, 1925.

Mr. Henry Klaus,
Burdett, Illinois,

Dear Mr. Klaus:

In accordance with the practice of this department I am writing you this letter containing the principal points in our understanding of the plan for Frederick's project to be conducted in connection with his first year of agriculture in Pavilion High School. I was glad to note particularly your favorable attitude toward the boy's full participation in the project. Unless the boy does participate fully in the solution of the various problems of care and management, the educational aspect of our work fails. I appreciate very much your coöperation.

The following points were particularly emphasized in our conference of last night and I am recording them as a basis of our understanding:

(1) That Frederick is to take over the home flock, consisting of approximately, thirty-five pullets, forty hens, and twenty-five or thirty cockerels, mostly Rhode Island Reds;

(2) That an inventory will be made about September, the first, to ascertain the value of the flock at that time;

(3) That Frederick will take over at that time the complete management of the flock, unless you agree to retain the cockerels for fattening;

(4) That you will furnish materials up to approximately fifty dollars to remodel the windows and repair the interior of the poultry house in keeping with better housing practices:

(5) That you will supply all necessary feeds in accordance with the best practices for that sized flock;

(6) That you will purchase high-grade eggs for spring hatching as a basis of building up the flock and will concur in the disposal of stock or eggs as Frederick's judgment prompts, assuming of course, that he is supposed to advise with you and me in such matters;

(7) That you will encourage him to carry on the project in a purely businesslike manner and will coöperate with me in this respect; and

(8) That Frederick is to have twenty per cent of net income from the flock, excepting the net income from fattening cockerels which, I understand, you desire to think over further.

If I have omitted any important point or if I stated any of the above points incorrectly, I shall expect you to remind me. It is important

that my arrangement with reference to Frederick's work shall not include plans out of keeping with these main points of agreement.

Appreciating the opportunity which I had to talk this matter over with you and Frederick, I am,

Very sincerely yours,

ALBERT G. DURHAM,
Teacher of Vocational Agriculture.

Since no legal contract can be made with a minor, and since the "Memorandum of Understanding" provides as much moral obligation as the other forms, it is a very satisfactory procedure. Furthermore, in general, it is less likely to create antagonism or unfavorable reactions. Whichever form is used, the agreement tends to simplify the teacher's program of instruction and supervision and, as indicated above, prevents misunderstandings which are so prejudicial to success in work of this kind.

(*c*) *Financial arrangements.*—A scheme for financing the project must be worked out. The financial problem can not be separated from that of selection, since the amount of capital available will determine in a large measure what sorts of farm practice may well be entered upon. It is clear also that, in the pupil's plan and in his agreement with his father, full consideration must be given to the financial arrangements. Perhaps no more important factor enters into and affects the economic outcome of farming than that of financial facilities. Since pupils may not—at least at the beginning—have funds available for the undertaking, the father must become a coöperative agent, either by acting as the boy's banker or by furnishing credit so that the project may be put upon a businesslike basis. Certain materials and equipment must be purchased in advance, and many projects will not show returns before the end. Unreasonable credit should not be granted a project worker simply because the father may be able to lend financial assistance. The whole scheme should be checked by the standards of good business practice.

Frequently, the financial question has hinged on how much the project worker may be expected to make. The authors hold that a conservatively safe financial plan should appear in the projects of the first year, with the greater emphasis upon the distinctly educational aspects, the expectation being that, in the continuation of the projects from year to year, the vocational aspects, involving more liberal financial arrangements, will be dominant. The motive of anticipated economic profit, whenever overemphasized, has become a boomerang to genuine interest in farming. Careful attention to price curves should be a part of any financing scheme. This part of the project activities should furnish one type of opportunity for becoming acquainted with business methods.

(*d*) *Handling the labor problem.*—Handling the labor situation, like financing, is a problem to be considered in advance, in selection as well as in organization. It presents less difficulty than financing, however, since in the selection of a project the pupil knows fairly accurately the amount of his time that may be available for the practical work. Two aspects of this problem appear: (1) what he himself should do; and (2) what may be done by others. In some departments, where distance from school makes boarding necessary and permits only week ends at home, the delegation of work to certain other members of the family is imperative; as a rule, however, project work should be done by the pupil himself. Exceptions may be made, with proper safeguards in the following cases: (1) where the same type of work has been done previously and the skills involved in the doing have already been attained; (2) where absence from the farm makes it necessary to delegate the work, provided the pupil presents in advance a satisfactory plan for getting the work done, for getting a report on work done, and for providing for attaining the skills involved in such operations; and (3) where a project is being repeated on a larger scale as a continuation project, and involves, at certain stages, a greater amount of labor than the pupil can perform alone, provided

the pupil manages the labor situation created, and has himself reached the standard of skill expected in these operations. The teacher should always act, in presenting the claims of the project upon the pupil's time, on the assumption that the pupil himself is to perform the work.

(*e*) *Completing the project.*—The completion of the project should be a part of the organization plan. Frequently, however, it is impossible to determine in advance when the project will be completed. If determination is based upon the completion of a year's work, the project may be completed on June 30, December 31, August 31, or any other definite date which may mark the end of the school year; however, if determination is based upon the completion of the entire cycle of jobs in a given enterprise, the completion may be reached at varying periods following the six-months' minimum of supervised farm experience, depending upon the natural cycle. A swine-fattening project will take less than a year; the poultry project may well run eighteen months.[2] In the organization plans, some tentative agreement must be made with reference to the ending of the project. It would be unfortunate if any pupil were led to believe that the project was not a permanent venture; however, he will dispose of a part of his products at some point in the cycle, which should be chosen with a view to his gaining experience in marketing. Presumably, the check-up will come at the end of a twelve-months' period in most projects.

3. Providing an adequate scheme of supervision.—The launching of the whole class upon their projects, in such a manner as to take account of all the foregoing factors, is the most significant step in the program of supervising these activities, and is a very difficult one. The pupil's selection of his project should be made under close supervision, first in order to see that the choices are made, and then in order to insure a more desirable outcome. The teacher must see

[2] Eaton, T. H., Vocational Education in Farming Occupations, 89–91, The Cycle of Production.

that the pupil's interests at home are considered, that the project activities fit into the program of school and farm, that the managerial responsibilities are properly placed, that the scope of the activities are in keeping with the pupils' ability, that essential conditions at home as well as at school are understood properly, that the projects fit into a developing scheme covering a period of years, and that a host of other phases and aspects are given due consideration. To accomplish this, he must rely constantly upon various aids and critical suggestions from those whose experience is broader than his own and perhaps more specific.

(*a*) The project-plan outline is a helpful supervisory instrument. This involves the keeping of a project notebook for each project undertaken, and furnishes excellent points of contact for checking the steps in the pupil's progress, for directing his study, for determining what difficulties may well demand class discussion, for emphasizing the advantages of a record of work done, and for preserving data for regular class instruction. It serves also to give the pupil experience in elaborating his thoughts, which are all too frequently left fragmentary and inarticulate.—(See Appendix, page 364.)

To say exactly what the project notebook outline should be, would be impossible and relatively futile. There has been a wide variation in the forms used. The educational and vocational purposes served in the project scheme will necessitate two approaches, one that of the educational features, and the other the financial and labor records. The keeping of elaborate records for the sake of their elaborateness would seem to be unwarranted; but such project records as will conserve the educational points involved and preserve an intelligent account of the business conducted are most valuable. Such a notebook should present certain features essential to the educational and vocational outcomes desired.

There should be, first of all, a statement of the larger purposes of the undertaking. In most of the notebooks that the authors have examined, there is a striking artificiality in the

pupil's statements of purposes, or else they are so general that nothing would have been lost if they had been omitted entirely. It seems that sufficient time should be spent with the class as a whole, and with the members individually, to eliminate this artificiality; otherwise the whole program tends to become formal. Teachers object to this criticism on the ground that elaborations of the purpose do actually appear in the project outline which follows this first brief statement. In a measure they do so appear, but usually the larger worth-while features and the reasons for the selection are omitted. A boy of seventeen who carried through a very satisfactory major project in swine raising, considering it from an educational point of view, incorporated in his notebook the following as a statement of his purpose:

> The purpose of conducting the above enterprise is to produce the best hogs for market in the cheapest possible manner. The swine project was suited to my conditions as I had culled beans as a cheap feed. I had raised hogs before and intend to get from this project the cost and amount of feed for raising one pound of pork.

The above statement is good as such statements usually go, but certainly other outstanding features of that project should be in the pupils' mind; and, unless there are other features, the pupil has failed to grasp, at the beginning at least, what the project is all about. There should be a further reference to individual interests in the project, and a statement of the relation of the swine industry to the agriculture of the community and to the home, of the bearing of this industry upon the work in the school, of its special bearing upon home conditions, and incidentally of its relation to practical problems, such as disposing of culled beans. The pupil should express conviction, in this statement of purpose, that the decision to carry out this project is justified.

In the second place, there should appear such an analysis of the enterprise as the typical successful farmer would make in carrying on that enterprise. Here again, some may object to the emphasis upon detailed job-analysis; however, this

enterprise not only gives the pupil an opportunity of acquiring, in a scientific and practical manner, the attitudes, knowledge, and skill involved in carrying on that enterprise, but also makes him familiar with a method of analysis which places before the pupil an array of the jobs which farmers do in connection with the enterprise selected. He can then arrange these jobs on a seasonal basis. Furthermore, the notebook should show, as the project progresses, the attitudes, knowledge, and skills required and gained in advancing the work. An outline of this kind can not be completed before the close of the natural cycle of the enterprise.

Dipping into the notebook of the young man whose statement of purpose has been criticized, the authors find a rather careful analysis of many of the jobs entering into his project. It is stated that on December 10 and 11, 1924, he was considering a change of ration for his swine, and that the class was dealing with the question of a proper and economical ration for swine, by attacking this project problem. He states that two days were given to this problem by the class (see page 231 for a further statement regarding the use of this project for class discussion), and he incorporates in his notebook a report on a proposed change in ration for his herd under the head of "Feeding the stock." His statement follows:

The daily ration which I fed the hogs was 4.5 lbs. of beans and 1.2 lbs. of corn each. For a period of six weeks each hog would consume 189 lbs. of cull beans and 50.4 lbs. of corn. This total ration would cost $2.34. On this ration the hogs gained 1.43 lbs. daily or the total gain would be 60 lbs. per head. The local price paid for pork was 9 cents per pound, making a total value for 60 lbs. gain in a week of $5.40. This would leave a profit for each hog over a period of six weeks of $3.06.

A ration recommended when using beans is ½ beans and ½ corn. By feeding 3.5 lbs. of beans and 3.5 lbs. of corn for a period of six weeks, the feed consumed would be 147 lbs. each of corn and beans. The cost of this feed would be $4.04. This ration gives a daily gain of 1.5 lbs. or a total gain of 63 lbs. for six weeks, which would be worth $5.67. The profit per head, using this ration, would be 89 cents.

I considered my ration more economical although I did not get as much daily gain as the recommended ration. The net profit per hog, using the first ration, exceeds the profit per hog, using the second ration, by $2.17. I, therefore, concluded that my ration was more economical and should not be changed.

During the first part of my project, I secured 1 lb. gain for every 3.56 lbs. of feed. However, apples played a large part in the ration. Counting the apples, I fed 5.53 lbs. of feed for each pound of gain.

My ration consisted of the more important elements which a ration should include. I had succulents, nitrogenous and carbonaceous concentrates and minerals.

During the first part of my project I fed corn meal and wheat mids alternately with the beans. It was during this period that I received 1.43 lbs. for the daily gain. During the last half of the project I considered it wise to feed all corn and beans instead of alternating with the mids. I did this in order to get more carbonaceous concentrates. At the same time I considered it advisable to feed whole corn instead of corn meal because the whole corn was cheaper and tests showed that the whole corn was better than ground corn. However, during the latter part of the project, I only secured .89 lb. gain per day. I did not consider this a loss due to the change in ration, because young hogs make more gain than older hogs. The whole corn was cooked with the beans.

A third essential in a notebook is the record. The above summarizing report on an important problem in the project was derived from records kept systematically and accurately. Some of these records dealt with important observations and experience, some with costs and gains, some with conclusions regarding progress. Most notebooks will include records of receipts and expenditures, but special features should not be overlooked. As a matter of fact, every project should have some feature or features for special observation and report. The teacher is largely responsible for having pupils incorporate significant data.

A year's business is never complete without a checking up. The closing of the records involves an inventory and a summary. The strong and weak points of the project should be noted. The plans made at the beginning of the year, for concluding the year's business, should be carried out

unless there is a good reason for changing them, in which case an explanation should be made. There should also be a statement concerning the economic outlook for the enterprise represented and the scientific principles involved in it.

(*b*) Impetus may be given to improvement impulses by checking plans and attainments in the project activities against tentative norms in the region, the home state, and elsewhere. This is a second method of supervising projects. Considerable progress has been made in raising the standard of these activities. The state supervisor places in the hands of teachers a report of accomplishments throughout the region of the state. The teacher finds that this furnishes an excellent check against his own work and, in turn, he can utilize it to good advantage in stimulating his pupils to coöperate toward a better school rating. This has been done with regard to the character of projects chosen, projects finished, size, and returns. Perhaps up-grading on size has come about more by informing the teachers by printed page, by conference, or other means the record of attainment in projects of the better schools, or of the better individuals.

It is not easy to determine what is a suitably sized project, but projects of different sizes may be ranked and rated. Objective standards of excellence should be established where possible. Colvin, in connection with his work in Illinois, constructed a score card which he recommended as a guide to teachers, "especially in directing the supervised practice of the students."[3] Seven points were suggested for consideration in his score card: the plan, records, efficiency in performance, economic income, skills, knowledge, and attitudes. With this score card as with all others, variability of degree of excellence in any point may necessitate the weighting of that factor for final score, since the significance of the standards of supervised practical work rest in the causes of the variation, and these are not simple. Until we can assign some values in definite amounts to these items,

[3] See Chapter XV, p. 329.

we can not determine accurately the relationship between variables in the score card and the score card as a whole.

(*c*) The project is a means and a method of teaching. If it is so used, the careful plan of the project-problems easily becomes an instrument of supervision. On pages 228, 229 is given a quotation from a project notebook. This shows two points that the authors wish to emphasize here, namely: (*a*) that the high quality of that report was due to the use which the teacher made of the swine project in teaching the class the problem of swine rations under the head of "Feeding the Stock" and the project worker's individual responsibility during the progress of the teaching; and (*b*) the better feeding of the swine in keeping with the best standards became a logical incident since it had become an integral part of the teaching. It actually became a means of supervision by in-direction.

Another entry in a teacher's record shows that on October 20, 1925, a class made "A field trip to visit Robert Sirrine's project." The object of the trip was, "To help Robert improve his junior project in poultry, in order to make it acceptable for a regular high-school project." In order to facilitate the work, the teacher appointed four committees, the chairman of each being a pupil who had had the course in poultry before. These four committees were to deal with the four major problems involved in the improvement of Robert's project: culling and selection, rations, housing, and control of enemies and diseases. The teacher gave Robert a supervision slip covering the recommendations of the several committees, which were as follows:

(*a*) Culling and Selection.—Actual culling with recommendation to market culls.

(*b*) Rations.—Big Egg Mash, O.K. but expensive, cheaper Cornell mash may be bought at Mecklenburg, also using wheat, oats, and corn on cob; advised to consult teacher for improved grain mixture. Finding oyster shell and charcoal in use, recommended grit for hens when shut in. Finding fresh water, no recommendation. Finding birds on free range, recommended green food when hens were shut in.

(*c*) Housing, Cornell shed roof, O.K.; light and ventilation, O.K.; one-third of floor of concrete, O.K.; dropping boards and nests, O.K.; but recommending concrete for two-thirds of the floor, replacing of poles with flat perches allowing 7 inches per bird, supplying one foot of hopper space for ten birds, removal of big tub of dust, or supply a dust bath outside of the house.

(*d*) Control of Enemies and Diseases.—The committee placed numbered leg bands on all birds kept and recorded by the culling committee, dusted the birds with sodium fluoride dust and, though no lice were found, left small bottle of carbolineum for spraying the house through. No mites were found; pointed out that several of the hens showed evidence of scaly leg and recommended the use of the kerosene treatment.

This shows the ultimate tie-up of class teaching and project activities and illustrates how teaching can be utilized as an instrument of supervision.

(*d*) Personal visits to the pupil at the farm are essential. Personal supervision is essential, first, to secure effective use of the project in instruction, and second, to insure reasonable success in its vocational aspects so that it may become a "powerful means of inducting the boy into the vocation of farming." The number of times the teacher visits a project is not particularly important; it is important, however, that individual help be rendered at crucial times to prevent loss and the use of bad methods. The character of the project has much to do with the scheduling of visits. When a sow is to farrow, or a sheep is to lamb; when an incubator is to be run, or brooding done; or when some similar job is to be performed, the presence of the teacher shows his interest in the project and enables him to give necessary aid. Many other aspects of project work, particularly those requiring inspection rather than supervision, can be checked by records and reports. Many teachers conduct periodical reviews of plans and problems at the school. Project visiting should focus on definite points, and a memorandum of the conditions needing attention and the recommendations made should be left with the boy. A pad, similar to the sales pad used in

a store, has been used profitably by many teachers. It is convenient and, if taken seriously, is not only an excellent tool for supervising the pupil, but also becomes an invaluable record for his use. It is absurd for a teacher to try to remember the details of projects and his recommendations concerning them. If he keeps a written record he will be more likely to remember such details, and if he forgets he can refer to the record.

There are other ways of supervising projects by visits. The field trip has been mentioned. This should be utilized in one form or another so that every boy is visited and checked by the class. The committee scheme suggested above is a variation devised by one teacher. An annual tour is not an uncommon method of stimulating good project work by contact. The supervision of projects is attended by many difficulties. In one department the average distance traveled by the members of the class in attending school was more than ten miles. In this case, not only are certain pupils necessarily absent from their projects during the week, but the high cost of travel, in energy and money, must be considered by the teacher. Some states make no provision for travel costs, thus placing a serious handicap upon the supervision of projects. It is poor economy to limit the traveling necessary for adequate supervision.

(*e*) Study the difficulties involved in the program of supervision. Many real difficulties arise in supervising projects. Sometimes a misunderstanding of the purpose of the project prevents the teacher from "making out a good case" for it. In spite of the fact, however, that many teachers give little attention to their problems of supervised farm practice, genuine difficulties are present. Teachers should note these and utilize improvement conferences and any other possible sources of help for ironing them out. A recent study [4] lists

[4] Buck, John Preston, An Analysis of Felt Difficulties of Teachers of Vocational Agriculture in Home Project Work. Unpublished Thesis, Cornell University.

in summary "Twenty Most Prominent Difficulties in Descending Scale" from a study of 180 replies to teachers of agriculture in New York, Tennessee, Texas, and West Virginia. The list includes the following difficulties:

1. To get projects started in time to get maximum teaching advantages.
3. To deal with project problems in class.
5. To get a "man size" project.
6. To get pupils to summarize, interpret and use project data.
9. To get projects selected on a business basis.
11. To get continuation projects.
12. To get the boy interested in his project.
13. To organize project work so as to be a most effective teaching means.
15. To get parents to grant full ownership and full management responsibilities to the boy in his project work.
17. To arrive at standards by which to measure the efficiency and improvement of pupils in their project work.
20. To get project work done on account of the teacher's absence during summer months doing professional improvement work.

4. Checking the results in terms of standards.—It is a common fault of teachers to pass over the concluding part of the project lightly. In many cases the time of closing the books and of making the final reports for credit is dragged out unduly. A more serious fault is the neglect of a full consideration of the strong and weak features of the project. Where considerable use is made, through class instruction, of the experience gained by the pupils in the course of their project activities, this error is less likely to appear. At the conclusion of the work the pupil is prepared to understand the value of the application of certain scientific principles and the importance of following good methods in whatever he does.

Future plans must be made upon the basis of work done. There is no more strategic time to revise plans for the future

than when the project is approaching completion; for it is during the period when the results of the expenditure of time, effort, and capital, are being realized that plans for the larger work of the future can be made most readily. This is in line with the position maintained throughout this discussion, that the project activities, beginning in the first year with less exacting projects, should lead in a series toward the senior year, during which the young man is prepared, by means of projects involving a much broader scope of activities, for immediate induction into full-time farming in some form or other.

THE GROUP PROJECT

Williams[5] points out that eight states require "class projects from all their established vocational agricultural departments," and "that thirty other states suggest class projects as highly desirable activities for their schools to become engaged in." The class or group project is one in which the class, or a part of it, is required to act as a group. Group projects are usually of the productive or improvement type, and are rarely demonstrative, according to Williams.

The group project conducted on the school farm is designed primarily for two classes of pupils,—those who must leave the home farm in order to gain opportunity for instruction, and those who have come from villages and therefore have had little or no apprenticeship in farming. The school farms have been identified for the most part with special agricultural schools. Here the group project may have special educative value for pupils who remain at the school farm during the entire year.

This type of project constitutes an excellent device for teaching the essentials of coöperation in planning and acting

[5] Fundamentals involved in the organization and conduct of vocational agricultural schools and classes, pp. 62, 63. State Board of Vocational Education, Topeka, Kansas.

together in a common enterprise. Without doubt, its greatest value resides in what it can do to supplement the work of the individual home project, since it offers little that the home project may not accomplish even more efficiently, and that without the introduction into agricultural education of an *unreal* situation. The types of class projects in agriculture should conform to the types of activities in which farmers engage collectively, and such projects should be carried on only in keeping with the best business practices. Some justification for the group project may be found in its by-products, among which are community interest in the work of the school and the pride which a group of boys take in doing their work well when they are being watched by the entire community.

DIRECTED FARM EXPERIENCE

Effective as is the home project as a device in teaching a farming occupation, it is found to embrace only a portion of the farm experience usually gained by pupils working on farms. Moreover, the home project presents administrative difficulties which are quite insurmountable in the case of some village boys and in the case of most students attending a special agricultural school where six months of supervised farm employment is the requirement for completing each year's instruction. One of the most valuable devices for supplementing the work of the home project, or for replacing it entirely for at least one year, is directed farm employment. Such employment may be conducted (*a*) as a supplement to the individual or class project or (*b*) in lieu of the individual home project. In the first instance, the teacher assumes responsibility for setting up an "activities checking list" and for providing opportunities for the pupil to engage in the activities listed in the enterprises to be taught and to receive instruction in them. In the second instance, it is the teacher's responsibility to provide a suitable farm on which the boy

may be regularly employed under approved conditions and under the supervision of the farmer and the teacher.

Checking farm activities.—Many writers and speakers have used the expression "farm skills," or "skill checking chart," or something similar, when they have been concerned primarily with activities and secondarily with skills. Usage, therefore, has made these expressions intelligible; however, it is well to keep in mind that skill is an expression of readiness to perform a particular activity. Thus, one may have skill in the activities of culling non-layers, of operating the Babcock test, of filing a saw, of caponizing a bird. On page 138 attention was directed to certain basic considerations relative to sensory and motor skills in farm activities. Motor skills are related primarily to special dexterity in the use of the muscles of the body; sensory skills are related primarily to readiness in sensory discrimination through one sense or through a combination of senses. Such discrimination appears in habit making; detecting physical differences in animals or crops, in selecting individual specimens on the basis of judgment built up by the aid of the senses, and in conducting physical examinations of materials with a view to making decisions, such as judging stock, culling poultry, or estimating the speed of a horse.

A third class of skills is that which functions in the exercise of managerial ability in performing farm activities. These skills are not independent of the sensory and motor types; in fact, they have their origin in a high development of sensory and motor skills in their respective complex relationships in the activities involved. One who possesses skill in managing a farm activity displays a readiness to detect and evaluate essential factors in making a decision, and to assign relative values accurately. Since the home project in teaching has been proven to be an effective device for training in managerial ability, its use and development for this purpose are worthy of serious consideration, especially on account of the difficulty which faces the teacher in establishing situations, outside of the project, which permit of actual managerial and

business practice for pupils.[6] The development of sensory and motor skills in activities seems to occupy the greater share of the time. Wherever possible, however, the teacher should strive to set up normal farm situations in which pupils may make and execute genuine managerial decisions. Much remains to be done in this particular direction. In farm management courses, the true significance of management ability is apparent. Practice must furnish the *real* basis for training and accomplishment in managerial skill.

For most purposes the mechanics of checking skill in farm activities is not difficult. When the various enterprises are analyzed into their component farm jobs, the several activities involved in their performance emerge and become the basis of selection and training. The teacher, in coöperation with successful farmers engaged in the respective enterprises for any given year, may well prepare the list of the farm activities which the pupil should perform. With such aids as are at his disposal, the teacher may well determine the degree of each kind of skill which furnishes the goal of attainment. When he has secured such a list, he may seek the coöperation of parents and other interested persons in planning for opportunities in these respective activities whereby the minimum or standard levels of skills may be attained. Most teachers would probably find it advantageous to make up for each boy an "activities chart" for a given year showing the standards of proficiency desired. Because of individual differences in pupils, their varying aptitudes and experiences, the unequal demands made upon them on the home farm, and the freedom permitted in the selection of projects, the "activities" program and skill-attainment levels will be likely to show considerable variation among the pupils of the class.

As the work of the farm progresses and the boy advances in his course, skill proficiency in the activities should be checked. This may be done (1) by observing the boy at work

[6] Some of the variations in farm practice discussed permit of some managerial responsibility.

and rating his ability from time to time in terms of standard practice for that activity in the community, (2) by accepting a statement from the parent or employer on the same basis as (1), or (3) by accepting a statement of the pupil on a self-rating scheme. As a basis of guidance in the acquisition of skill in these farm activities, charts showing the lists of activities and appropriate spaces for designating marks of achievement constitute a helpful device.

In preparing an "activities" list in which it is desired to rate skills, it is important to classify activities—at least sufficiently to distinguish an activity such as operating an incubator from that of adjusting the thermostat; or an activity such as soldering a hole in the milk pail from tinning a copper, making killed acid, tinning the metal, and applying flux. The more specific the activity, the more conspicuous and essential the skill becomes in the whole operation. This accounts for the frequent failure to distinguish between an activity (job) and the skill involved in performing the job. The more detailed the analysis of an activity, the greater the skill needed to perform that activity, if such analysis is significant in meeting the standard practices involved. The point of chief significance is whether the activity is so well analyzed that the pupil can see where proficiency of skill is needed in order to perform the activity satisfactorily.

In setting the skill-attainment program for each pupil, two factors are important: (1) the age at which the pupil should begin to gain proficiency and the age at which one would normally expect him to have attained reasonable vocational competency in each activity, and (2) the allocation of responsibility for training.

Boys born and reared on a farm acquire some skill proficiency in hundreds of activities by habitually taking part in the routine work of the farm. Their skill proficiency in such activities will be shown at once on the attainment list. Because of the parent's unwillingness to allow the boy to do certain work, because of the pupil's being away at school,

because of his lack of physical strength, or for other reasons, many farm activities will be found in which he has no proficiency whatever. Wide variation is observed in the interests and abilities of boys in becoming skillful in various pieces of work. Some boys like cattle and dislike poultry or field work. Others like engines and power machines, but dislike the problems of marketing. A cross-sectional view of the abilities of pupils will serve as a guide to the teacher in determining the age at which pupils may normally be expected to begin instruction for specific skills, as well as the age at which they may be expected to be reasonably proficient in such skills.

It is to be noted that the terms "proficiency" and "competency" in skills are used relatively rather than absolutely. Many factors contribute to variation in standard. Experience would indicate that the sound standard for the teacher to set is the proficiency or degree of skill found to be possessed by the upper fifty per cent of the successful farmers. The two chief standards in measuring skill proficiency appear to be (1) the quality of the product, such as the condition of the saw that has been filed, the laying performance of the hen that has been culled, or the fitness for use of the harness that has been mended, and (2) the rate at which work is accomplished, that is, the number of cows under average production to be milked per hour, the number of acres to be plowed with a walking plow under stated conditions of time and soil, the number of acres of hay to be cut in an eight-hour day, or the number of barrels of apples to be packed in a given time.

Attempts have been made to indicate the activities embraced in given enterprises, in which skill must be attained if vocational competency is to be secured. The main questions involved are as follows: What are the activities that must be performed in carrying on a given enterprise satisfactorily? Which of these need to be taught? Who shall be responsible for the training? Who shall be responsible for allocating the

training functions? Who shall be responsible for checking results and approving the practice? A few preliminary studies[7] have been made in the activities of the various farm enterprises to determine the age levels for beginning and the completing of training for attaining vocational competency and the allocation of responsibility for instruction.

FARM EXPERIENCE IN LIEU OF PROJECT

In the case of a village boy who does not have available land or equipment for a project, and in the case of many students at special schools, the farm-employment form of supervised practice provides an effective means of instruction. Under this plan the pupil is "apprenticed" to the farmer for the growing season and earns whatever his labor is worth in the opinion of his employer. He should be encouraged perhaps to accumulate during his first year's work the maximum amount of cash in order that he may have the working capital for his projects in subsequent years. The chief weakness of the farm-employment plan is that little opportunity is afforded for making managerial decisions. Its chief strength resides in the excellent opportunity to gain proficiency of skill in performing the usual activities in a given type of farming. In arranging for farm employment, it is important for parent, employer, pupil, and teacher to have a clear understanding of the type of work to be done, hours of work, living conditions, wages, and the extent to which the farmer may be relied upon to instruct the boy.

Merely working on the farm is not sufficient. Each pupil so employed should make arrangements as early in the year as possible, and should make a study of the business organization and layout of the farm. During the season he should keep a diary of the important activities. This diary will be particularly helpful for future study if special attention is

[7] Professor C. B. Gentry of the State College of Agriculture, Storrs, Conn., with the aid of the Connecticut teachers of agriculture, has done considerable work in the principal enterprises of that state.

devoted to management and business problems which are perplexing to the boy and which every farmer must face. Dates of planting, dates of harvesting, appearance of diseases, and similar items will also add much to the value of the diary. At the close of the year, pupils should make a study of the business organization in accordance with such outlines as that given in Exercise 196, "Exercises in Farm Management," Warren and Livermore. It is to the advantage of the pupil to return to the same farm the second and third year and to rent land for a cash crop or buy his own livestock and keep it on the farm in addition to his farm employment.

Farm employment for high-school as well as for special-school students should be permitted only on those farms that represent the type of farming for which the pupils are preparing. To permit a pupil, employed on a large farm, to be assigned to a few routine duties because he happens to be particularly proficient in them, is to thwart a basic principle of this type of farm experience. Farmers who understand the plan of instruction are usually willing to provide a wide diversity of experience over the entire farm. A seven-year test of this plan of supervised practice work for special schools of agriculture has shown it to be very satisfactory from the standpoint of the employing farmer, of the pupil, and of the teacher. Best results appear to have been accomplished when the farm employment in special schools has been supplemented by home projects conducted as described above.

MANAGEMENT OF MANY ENTERPRISES

One of the most desirable forms of directed practice is the acceptance of responsibility on the part of the pupil for managing and conducting all or nearly all of the enterprises on the home farm. Such a condition obtains when the boy, because of the death or illness of his father, or because the father works in town, finds himself in the saddle as a true farm manager. Many such cases have come under the observation of the authors. In the real vocational problem which emerges from such a situation, the alert teacher finds

an almost ideal means of correlating practice work in class teaching.

In the case of many part-time and practically all evening-class students, full responsibility for the management of the entire farm rests on the student. Herein resides an important criterion in the provision for the supervised farm experience for this group. The entire farm, or such major portion of it as is of special interest to the student, should be selected as the basis for intensive study and work. Wherever financial records are available, it will be very much to the student's advantage to study them. In many types of practice, however, such as special work with tractors or power equipment, rearanging fields, and installing water systems, immediate financial returns are difficult to evaluate. With this group, the key to successful practice is found in the selection of those pieces of work that are of vital interest to the student. Supervision consists primarily in systematic guidance and follow-up in the particular problems studied.

DIRECTED FARM STUDIES

It is quite likely that the home project, specific skill training, and farm employment, will fail to provide the range of experience needed in a comprehensive preparation for a particular farming occupation, because pupils need a much wider experience than that afforded by the home farm or the farm on which they may be employed. Farm studies constitute an effective device for broadening the pupils' knowledge and experience. These studies are an essential part of the survey method of teaching. By means of such studies pupils observe the practice of farmers, merchants, freight agents, and the like, secure data from them, and study the results of their work. Studies are also made of crops, farms, livestock, buildings, and poultry. Such contacts with men and life problems constitute one of the soundest possible bases on which to build plans for the organization of the work to be done by individuals while they are still students or when they become farm operators. Farm studies assist teaching by giving the

instructor specific knowledge that the members of the class have had relatively common experiences, on the basis of which he may build his assignment, his practical work, and his teaching procedure. Such studies also provide a background of actual experience by means of which the classroom teaching may be vitalized. The experience gained by the pupil is the most vital factor in education. Having the course outlined by enterprises and jobs is no assurance that the teaching will be vocational. The jobs must serve as life problems from which may develop needs of individual pupils or special knowledge and skill. If the pupil can not actually engage in the thousands of activities encountered in a given type of farming, his next most effective means of acquiring knowledge and skill is to observe the work of others in the vocation. See page 274 for a discussion of the survey method of teaching.

Summary.—This rather long discussion is designed to set forth: (1) the necessity of some form of supervised farm practice in agricultural instruction; and (2) the manner in which this may be secured for the high-school pupil by means of individual projects, by participation in group or class projects, by directed farm experience, or by supplementary types of practical work. The project is discussed under four heads: selecting projects that are strategic for organization, development, and results; organizing projects for the most economical and effective results; supervising projects to provide an adequate basis for the pupils' progress and for correlation with teaching; and, finally, checking results as a basis of final evaluation and of future plans. Other forms of supervised farm experience may supplement the project or may serve, to some extent, as substitutes for it. The more important are the group project, directed farm experience, managing farm enterprises, and surveying farm practices.

BIBLIOGRAPHY

References on Supervised Farm Experience follow the discussions of Chapter XI.

CHAPTER XI

EVALUATING THE PROJECT AS A TEACHING DEVICE

In the preceding chapter an attempt was made to show, by illustration and description, how the project, supplemented by certain other types of practical activities, serves the purpose of bringing the vocation of farming into intimate contact with the school program, (1) so that the practical difficulties of the farming activities may be available as first-hand experience for educative purposes, and (2) so that the facts and principles which the school is able to utilize in teaching agriculture may appear in actual life settings. The project may be defined, for our purpose, as a farm enterprise modified to meet the conditions imposed by attendance at school, based upon a plan to which parent, teacher, and pupil have agreed, and carried out by the pupil in its natural setting as a unit of activity typical of the enterprise as carried on in the school patronage area. This implies that the farm enterprise which constitutes the project is fundamentally similar, in purpose and form, to the same type of farm enterprise as carried on by the full-time farmer. In this connection it is to be noted that in general it would be expected that pupils' projects will represent the enterprises of chief significance in the community—enterprises which the teacher must consider in the building up of courses and curricula, and for which pupils would likely show greatest interest and expect greatest returns.

In the application of this conception to teaching, two opposing interpretations have been widely accepted. One of these makes the project central or pivotal in teaching; the other makes it applicative or supplemental. Many teachers

of agriculture accept in theory, if not in practice, the former interpretation. Most teachers in general education, however, appear to think of the project as applicative or supplemental, a means of making classroom instruction vital by applying principles taught in class to some *real* situation. McMurry,[1] writing on the subject of general education, points out that the real emphasis should be "upon big projects, as thought centers around which the numerous facts are organized." In addition to the above two points of view regarding the use of the project, still wider conceptions of its meaning and use are current. The pupil's purpose to carry on a "man-size" project at any given time is the cumulative effect of previous purposes, each of which may at some time have been expressed in activities in natural settings and may thus have constituted a project; such purposes may include driving a horse, making a box for the cart, catching a pig, climbing a tree, digging a cave, or building a boat.[2] This suggests that the project stands for a continuous series of purposed activities, each reflecting real life, but each representing at successive intervals greater *realness,* because it is becoming more and more identified with the normal life of adults. This is a fundamental conception of education. Education is made for life in life, always approaching a better expression,—"The last of life, for which the first was made." [3]

The recent tendency in curriculum building is to base the selection of content upon the typical activities of teeming life. Except in certain practical fields, however, the pupil is asked to study the activities involved in the projects of other people, who are either geographically remote or long since dead. Instead, therefore, of participating in these

[1] McMurry, C. A., Teaching by Projects, Macmillan. McMurry accepts a much broader definition of project than that accepted in agriculture, since he appears to identify it with type problem.

[2] James Whitcomb Riley, in his poem, *The Boy Lives on Our Farm,* shows the reality of boy life in the attitude of doing *real* things.

[3] Robert Browning, *Rabbi Ben Ezra,*

studies, as he would in raising an acre of potatoes or in managing a flock of white leghorn hens, he must study content that has been organized for him as an expression of the project activities of others. He may appreciate this as relatively worth while in the absence of the individual opportunity to participate.[4] Biography is particularly effective in arousing the pupil's interest in life. The stories of human conflict in history always challenge attention. The struggles of scientists and inventors also stir the imagination of youth. In fact, any record of human endeavor tends to appeal to dynamic youth. This, in general, is the meaning of the "project" emphasis when applied to the general program of education. In vocational education the participation is actual and not vicarious.

CHECK AGAINST THE STANDARDS OF TEACHING

Any device used in education must be subjected to the standards of good teaching if it is to hold a permanent place among teaching methods. Does the individual home project, as used in agriculture, stand the test? A device, if worth anything, must make it easier to control the principles involved in establishing a good teaching situation and must make it easier for the pupil to grasp the meanings to be conveyed. Does the project tend to create a desire for activity and mastery? Does it provide for the expression of initiative and judgment which good teaching requires? Is the provision for organized thought met? What are its advantages for the application of experiences to new situations? On the whole, is it disciplinary? The project seems to meet these standards. Before these questions are discussed in order, it will be well to examine a few observations made by pupils and teachers, in connection with the illustrations presented on pages 205–214.

[4] This sort of training is not wholly unlike the physical development one gets in watching a football game from a seat in the stadium. This is not inconsiderable when two great teams struggle for supremacy.

[5] Conducting Supervised Practice.

The pupil, in Case 1, had a workable-sized project[6] involving sufficient capital to command his best efforts. The teacher reported that the success of the project was due, first of all, to the interest which the project aroused; second, to the satisfaction which the pupil's selection of high-grade stock brought; third, to his having provided good equipment and exercised painstaking care, both of these being matters of interest, initiative, and judgment; and last, but perhaps not least, to the fine coöperation between the parents and the school on the one hand, and between the parents and their son on the other.

In Case 2, the simple though significant decision to purchase certified seed seemed to stimulate the pupil to emphasize the very best cultural practices. Financial return, though a factor of consequence, appeared to be subordinate to the ideas of mastering the best practices. The pupil reported that the greatest value which he received came through the improvement of cultural practices which his contact with the best potato growers and his own analysis of the potato enterprise made possible.

In Case 3, certain factors were observed by pupil and teacher as affecting the successful prosecution of the undertaking. These related primarily to the details of management, which were left entirely to the pupil. The principal factors may be summed up as follows: (1) *personal attitude*, expressed in interest and enthusiasm, in the close attention given to details, in the execution of sound decisions, and in the definite goal which was set up, namely, to surpass the record made by the pupil's brother; (2) *social connections*, expressed in the pupil's relations with successful poultrymen from whom he purchased eggs of certified stock, with his parents, with the teacher from whom he sought counsel, and with the public to whom he looked for his market; (3) *enterprise analysis* which showed that the more prosperous poultrymen used the best stock, perfected housing conditions as far

[6] See p. 258 on discussion of size.

as possible, used the best and most economical feeds, eliminated poor layers frequently during the summer, developed special marketing facilities, planned a continuous business, and remained alert to the changes taking place in the country; and (4) *community opportunity*, as revealed in the coöperation of farmers, the relative importance of the poultry enterprise, the competing demands for labor, and the labor income which could be expected. The other cases showed similar factors stimulating the worker to effort and achievement.

The discussion below shows in part how well the project meets the following standards of good teaching:

1. The project motivates.
2. The project provides for initiative.
3. The project supplies opportunities for making choices.
4. The project involves organization of thought.
5. The project points to utility and application.
6. The project provides for self-discipline.

1. The project motivates.—The first condition of learning by any method is the willingness of the learner. Motive[7] is essentially that inner stimulation of the organism which, by giving rise to a conscious want, causes the organism to tend to maintain a state of tension or to provide a release of energy in directions appropriate to a larger life just ahead. Motive is the basis of interest and is a condition of effort. The advantage of a project in which there is actual participation comes from the multiplication of the points of contact for stimulation. The project is a *whole* experience, large enough to embrace not only large problems which arrest attention, but also an orderly arrangement of these problems in a functioning relationship.[8] This tends to release the energy necessary to promote the pupil's strivings toward the ends involved. The single isolated problem, on the other

[7] See Dewey's "Human Nature and Conduct," Ch. II, Changing Human Nature, for an excellent interpretation of motive.

[8] See p. 245.

hand, loses its momentum in experience before any significant relationships are appreciated.

The project in agriculture is particularly motivating, for several reasons. In the first place, it permits of a wide range of physical expression. Children are born individualistic and are inclined to resist restrictions placed upon their freedom. The opportunities for free expression, furnished by the project, appeal to the youth whose school education has tended to restrict his freedom. The pupil who goes "storming out to play" tends also to go exuberantly to the school garden (especially at planting time, if not when the weeds come up) and to the other opportunities for free self-expression offered by the various projects. Thus the tendency away from restriction and toward freedom is capitalized in the project. This tendency is deep-seated in human nature at every stage from the kindergarten to and through the university.

In addition to this fundamental desire for physical expression, manipulation, and control, the individual finds in his nature a further source of accentuated activity. When he would otherwise rest he is stimulated by the activities of others. This tendency takes two directions, one of which leads to a test of the abilities of various individuals—or what we call competition, while the other leads to a recognition of the futility of further competition when this involves an uneconomical expenditure of energy—or what we call coöperation. The value of competition and coöperation as "stirrers to action" is displayed in all genuine project activities. In the discussion of project supervision, on page 233, the authors showed how these two strong tendencies of human nature may be used to promote the work at hand.

One further factor peculiar to the agricultural project may be cited here as evidence of its motivating effect; this is the factor of *economic return*. The advantage possessed by this type of education, from the standpoint of motivation, rests on the fact that it is *vocational*. Vocational education implies an economic return. It happens frequently that the economic

aspect of the project is overemphasized; however, the authors have observed that where pupils set out to secure an economic return comparable to the returns secured in the community on a "man-size" basis, the entire project is much more challenging and its educational significance is likewise more marked. Under these conditions the project makes a strong appeal to the youth of high-school age. He sees in it a means of earning money for the immediate needs of his social life, which is now undergoing changes incident to adolescence, a means of securing, by his own efforts, a college education or a start in the business of farming a few years hence, or a means of attaining mastery over the forces of nature, which may be measured by his fellows in economic terms. This economic appeal to adolescent youth is a re-expression, in an economic and social world, of something that has already been expressed in his limited child world of relative dependence.

2. The project provides for initiative.—Self-activity, as a principle of teaching, and therefore of learning, has been emphasized in some new form in every generation, to counteract the tendency of education to become formal and ineffectual. The accumulation of experiences and the multiplication of incidental cultural materials have tended to overcrowd the curriculum with facts and abstract principles. The constant effort of educators to reconstruct the curriculum so that it may the better reflect the real life of the times is society's attempt to provide conditions for self-expression and incidental training in constructive thinking.

The project, first of all, reflects the pupil's own desires. On page 217, emphasis was placed upon the fact that pupils should be required to initiate their own programs and carry them out. Having freely elected the agricultural course, they must now abide by the laws inherent in that choice. A large measure of responsibility rests, therefore, upon the project worker. The freedom that comes to an individual by virtue of his choices is made permanent only by his keeping the

laws that inhere in that freedom. The pupil must first initiate his whole program, whatever his project may be; he then becomes responsible for independent action in devising ways and means of carrying the project through to its appropriate outcome. The more or less vague expressions of initiative that characterize the first stages of the project yield to clearer and more definite expressions. The initial spurts of enthusiasm give way to a sustained norm which is imposed by the daily demands of the project, such as feeding, marketing, or weeding. It is not implied in this paragraph that the pupil should follow the "trial and error" method in order to secure his full expression of initiative. The wise teacher, with the wise parent and his more or less wise neighbors, is invaluable in furnishing, first, the best models within the pupil's range of observation, and, second, the most wholesome counsel for his procedure. The main consideration is to give the youth a maximum of opportunity for continuous self-expression.

This leads to the consideration of a second fundamental aspect of self-activity which the project fosters in an effective manner, namely, regard for individual differences. The project permits of variation of practice in accordance with the pupil's abilities and opportunities. (See Chapter IV for reference to individual differences.) Not only may differences of capacity and training be recognized at the beginning of the project, but there may also be continuous differentiation of purpose and method as the work proceeds. This is possible, first, because varying ends are comparable for educational value, and, second, because a variety of avenues lead to these ends. For example, it is relatively immaterial, from the standpoint of school organization, whether the pupil learn to plow, harrow, or cultivate in a bean field or in a corn field, but it may be exceedingly important to the pupil to grow beans rather than corn, or *vice versa*. Or, taking "Growing beans" as an example, it is not particularly significant, from the standpoint of the pupil's education at the school, whether

he grows Red Kidney, Yellow Eye, or Pea beans, but it may be exceedingly significant from the standpoint of his success at bean growing on a particular farm. Thus the project as a device gives great latitude for the expression of individual initiative as a general aspect of a favorable learning situation, and reinforces this by multiplying the conditions for the recognition of individual differences.

3. The project supplies opportunities of choosing.—Where there are large opportunities for self-expression, there we find likewise many opportunities for choosing, that is, for exercising judgment. The project, having been launched with abundance of physical energy and in the direction preferred by the pupil, gives rise to all sorts of decisions on higher and lower levels. At every step in the development of the project, decisions of varying degrees of significance must be made. Each decision, however made, sets the limits within which subsequent decisions may be made. If, for example, I decide to farm, my decisions will be made in agriculture and not in medicine; if I decide to engage in poultry farming, my decisions will relate to poultry and not to dairy animals. If I decide to hatch with hens, my subsequent decisions must deal with hens, not with incubators. In other words, the field for self-expression furnishes opportunities for making decisions relative to these acts of self-expression. The project is full of situations demanding the evaluation of experience and the making of significant decisions. Contrast this type of decision with the type displayed in *merely* recognizing the superior decisions of some one else. As an example of the latter type may be mentioned the pupil's elated approval of the plan for reclaiming arid or desert lands in Egypt or India, as set forth by some authority who has had first-hand experience.

Besides providing for a continuous expression of initiative from beginning to end, the project also furnishes a related series of situations for the expression of decisions. The pupil may have to decide what breed of poultry to keep; if so,

he will also have to select desirable birds, and, later, to eliminate the poorer birds. He will have to make decisions concerning types of feed formulas, the location of the brooder house, and types of perches. All of these decisions demand a continuous expression of judgment, in a venture for which the project worker must hold himself responsible from beginning to end. A further aspect of this sort of training is that the decisions made are stated in definite form, though perhaps not in syllogistic form. They are stated in the forms of their expression. If, for example, a pupil chooses the Black Minorca, he has Black Minorcas and not White Leghorns. He stands or falls in terms of his decisions. Few forms of teaching provide a greater opportunity for definiteness of results. Wherever one turns in evaluating the pupil's project, one beholds the fruits of his decisions expressed in tangible forms.

4. The project involves organization of thought.—The project begins as a unit of activity which comprehends many related problems. The details of these problems are at first vague, but they appear purposeful because of their bearing upon the large unit of activity of which they are a part. The large units of activity, reinforced so strongly by the impulses which native tendencies supply, become great organizing centers for the interpretation, evaluation, and classification of experiences in the light of the purposes which these units embody. Progress in learning by projects is primarily a matter of adjusting means to ends in the best possible way, the form of the adjustment suggesting itself in the process. Organization of one's experiences results from the process of building up a system of relationships out of one's own experience, and this the project requires. The organization is genuine rather than spurious; it is dynamic rather than static; it is natural rather than artificial.

5. The project points to utility and application.—In the acquisition of new attitudes, new knowledge, and new skills, the goal should be the utilization of these attainments in one's strivings for larger ends. It is a false philosophy that holds

that truth exists merely for truth's sake. Truth should make us free, and unless it does so, it can hardly be said to be worth gaining. In the project, application is the beginning and the end. It is the expression of the functioning relations in experience. The project is an hypothesis of a larger life of expression. It is projecting,—pointing ahead to new uses, new appreciations, and new meanings. Thus, what begins as a large unit of activity, dominated for the time being by a certain relevant purpose, consists at the end of certain things done, certain values established, and certain meanings applied. The end has been realized, but the experience gained is available for new cycles of application. The project begins, therefore, in application, and ends with a larger application; it prepares the worker for a higher level of application; it places knowledge in its proper perspective; and it gives a more adequate conception of the relationship of experience to proficiency.

6. The project provides for self-discipline.—There are many conceptions of discipline from the standpoint of teaching. It is not the authors' purpose to discuss the question here. It is important, however, to state that the best type of discipline is self-discipline, which results from the correction and direction of genuine self-expression through the realization of a specific purpose embodied in units of activity. Discipline secured through one activity is of value in another only insofar as the two give evidence of common elements or ideals. The discipline which the project can afford is, therefore, first of all, specific. It should be remembered, however, that the various farm enterprises have many common elements. The pupil may learn how to plow in preparing the soil for any crop of a given type. He may learn—with less precision, perhaps,—how to feed farm animals by feeding any animal of a certain type. He may even postulate certain fairly reliable types of procedure in dealing with crops and animals by observing how the laws of nature work in the development of one animal or plant.

The authors' purpose in mentioning discipline at this point is to emphasize the particular checks by which the individual who works with projects is induced to "toe the mark," so to speak. First of all, the project is an activity in a natural setting. It is here that the worker sees the relative inevitableness of nature's laws and the necessity of abiding by them or controlling them to certain definite ends. Nature supplies abundance of energy for activity but leaves its use and control to us. The choices that are made result in certain outcomes which are relatively fixed. The choice of crops to raise, the choice of soil for these crops, the choice of seeds for growing, the choice of cultural practices, and a continuous stream of decisions made, bring their inevitable results. Nature is youth's first and sternest task-mistress; the project in agriculture looks to nature first of all. In the second place, the project is carried on in a social environment, where the group reproaches and condemns, or approves and stimulates. The teacher of agriculture seizes upon group sanction to maintain a high standard of accomplishment in the project activities.[9] The project worker is eager to merit the approval of the group of which he is a part and to avoid the embarrassment and chagrin that accompany disapproval.

The project is an excellent instrument of discipline in another respect. The pupil senses his responsibility in this part of his work, for it reflects his individual integrity. His outward expressions in whatever he does are the index of his mental capacity. The average person's self-respect depends upon his being highly rated by others. The approval of his fellows and the accompanying reaction give him a basis of self-rating. He becomes more and more sensitive to his own inherent power to accomplish a "man-size" task. These three aspects of control which the project reveals reflect the essentials of genuine discipline, that of inner impulsion rather than that of outer compulsion. "An activity that provides genuine problems, places responsibility upon the individual for initia-

[9] See under supervision of project, pp. 230, 233.

tive, judgment, and organization of thought, and is dominated by his useful and applicative connections is an activity par excellence, for discipline. In fact, it exalts the idea of real discipline, the kind that gets its meaning in the organization of one's facts with reference to an activity that is felt worth while and for which responsibility is definitely placed and accepted.''[10]

The project does more than this.—Not only does the project stand the test of good classroom teaching standards, but it is rich in incidental education. Since its central drive is life, ''and that more abundantly,'' it furnishes a vantage point for comprehending the value of knowledge and the relative importance of tool subjects. Tool subjects, studied for their own sake, rarely hold one's interest long. The project furnishes the pupil with one of his few opportunities for discovery, the greatest incentive to scholarship which we have. It utilizes a mode of procedure which is inherent in the nature of the activity, and this procedure supplies a unified purpose and an order without which, even with the best of teaching, the problems would tend to remain detached and artificial. It relates home and school as few devices do. It creates a rich supply of educational by-products because of its ramifications into all types of social endeavor. It tends to integrate the factors of experience so that not only are their intrinsic values discovered, but the meanings of the whole of experience are clearer and more vital.

SPECIAL QUESTIONS

In selecting projects which may be expected to lead to certain desired outcomes, it has been pointed out that the factors involved must be so integrated at any given pupil level that the learning processes may go on most economically toward the realization of the ends sought. This is not an

[10] Stewart, Rolland M., The Project as a Method of Teaching, School Science and Mathematics, 1920, 20, 594–601.

easy task, especially where pupils are taught in groups. It is desired that the pupil develop normally through his curriculum of study, and that in so doing he acquire as great a momentum in his progress toward farming as conditions permit. This always involves the question of the size of the project. What are the criteria of size? There is no "proper size" project, in general, since the values sought are implicit in specific purposes and in the means and methods of their accomplishment. Without definite data, one may say that the size must be compatible with the age and experience level of the pupil, the standards of vocational practices within the enterprise in his community, the home situation, and the import of the project in inducting the pupil into farming. In general, the "just right" size would be that size which yields the maximum of educational value in the understanding and the solving of the problems confronted in any given enterprise. From an educational standpoint, therefore, the project should supply sufficient concrete data, with reference to the problems of a particular enterprise, to furnish a satisfactory basis for the determination of the best practice, including principles of selection, of nurture, of protection, and of disposal, as suggested by Eaton. The project should command the pupil's respect and should exalt the vocational motive. It should impel strongly to permanent participation in farming. When it ceases to have educational significance, it ceases to become a school responsibility.

To show how the scope of projects may well vary from place to place, the comparison of Minnesota, Maine, and New Jersey, with reference to the potato enterprise, is suggested. It is enlightening to understand the varying conditions under which this crop is cultivated and marketed in these states:

Minnesota exceeds all other states in total acres and total yields. Maine with an acreage of about one-third that of Minnesota, had more than ninety-five per cent of Minnesota's total yield and an acreage of 140 bushels more per acre than the average for the United States as a whole, and 100 bushels more than for any other state. New Jersey,

not conspicuous for large total acreage, ranks first among the potato-producing states in proportion to size, and on account of climatic conditions and proximity to large urban markets, particularly New York City, the value of her crop is significant.

It is clear; therefore, that the scope of potato projects in the different states would be determined not simply by generally uniform expressions but by a balancing of the factors under the conditions of the place.

In the Red River Valley, stretching along Western Minnesota and reaching over into North Dakota for thirty or forty miles, is found rich alluvial soil reported to be several hundred feet deep in places. In Maine there are certain counties especially well adapted to potato raising and here the fertility of the soil is maintained scrupulously by scientific methods of crop rotation. In New Jersey it is the green sand marl soils that are famous for potatoes. Large amounts of commercial fertilizers are used here, as high as thirty dollars having been spent on a single acre, where early marketing makes this a profitable investment. *Cultural practices, marketing facilities, climatic conditions, transportation* accommodations, labor population, and the nature of competing enterprises are some of the factors which, integrating into all sorts of complexes, justify many forms of vocational completeness.

Another significant question has arisen from time to time in several of the states where recognition of highly specialized types of projects is sought. For example, is a "fattening" project a genuine type from the standpoint of vocational education? Again, it would be difficult, if not entirely impossible, to determine what sorts of activities would constitute a legitimate farm enterprise. Certainly a "fattening" enterprise represents the marginal type of farming enterprises, though fattening animals may well be a part of most animal enterprises. In this connection it is well to consider certain variations in form or use which give rise to types of projects.

(*a*) Projects vary according to the type of emphasis, and many considerations are involved in each type. Some projects are predominantly productive, as, for example, a poultry project for producing market eggs at a profit. Some are trial, or "finding," projects, and are prevocational in character.

There are also improvement projects, in which definite attempts are made to show improvement in production in keeping with standardized methods. Another type is the management project in which, for example, the pupil manages the dairy herd, perhaps including the growing of feeds necessary for the herd (the project being to that extent productive) and the handling of at least a part of the business involved. Such projects are limited, for the most part, to upper-class pupils. The class or group project [11] lays special emphasis upon coöperative endeavor, and, when limited to those activities in which farmers ordinarily coöperate, it is a very important type. Then we have the community project, which embraces practically all, if not all, of the significant aspects of the class or group project. Here the class sets out to promote some agricultural interest which has risen, no doubt, in connection with classroom instruction and which affects the community welfare. This is a sort of promotion project; for example, the testing of cows by pupils studying dairying may lead to the formation of a cow-testing association. All types serve their respective purposes in a well-balanced course of vocational instruction; but what the best one-fourth of the farmers do furnishes a good check upon the extravagant emphasis of many merely promotional types.

(*b*) Projects vary in the amount of coöperation involved. The pupil may engage in a project which makes relatively slight demands upon other persons. Many teachers find it necessary to accept projects of limited scope, especially during the first year, when the pupil's capital is small, when parents are less convinced that the project as a device is really essential, and where a definite beginning, even though limited, is the promise of the nucleus of a larger and continuous growth during subsequent years. The wise teacher, therefore, plans for an increasing scope of pupil relationship to persons, things, and abstract ideas as the plan of projects evolves from

[11] The group project was discussed under "Conducting Supervised Practice," p. 235.

year to year. The first year may be devoted largely to "finding" projects; but if the finding is actually done, this beginning is, as indicated above, the nucleus of a cumulative series which expands with each successive year, preparatory to the pupil's entrance into the vocation of farming. Some of these projects are called "continuation" projects. In this case the pupil has continued old projects and has begun new ones. He has been brought gradually into complex business relationships, especially with his father, and has thus been prepared for a more favorable introduction to farming. The projects may actually become smaller, giving way to a broader program of supervised practice, approaching actual farming.

The home project has limitations.—The project method of teaching is not intended to supplant other teaching devices. The project is a device for a special purpose. Even if it were possible to have a project for each of the main purposes in the curriculum, there would always be gaps which would require other methods for an economic and balanced program of teaching. The project method has been exploited for several years and the term has been used frequently where little of its fundamental meaning inhered.

In succeeding chapters, the emphasis placed upon other methods of teaching will indicate the particular function of the project method in agricultural teaching. The project method will not take the place of informational studies; used alone, it will hardly give us all desired ideals and skills. Its great contribution resides in the active participation which it affords, whereby the pupil learns to attack the problems inherent in a *real* life situation. The general-education people have left much confusion in the minds of teachers by leaving out of most of their projects the idea of "natural setting," the *sine qua non* of a genuine project. It would be better to retain the term "project method" only when the teaching situations are similar to those of real life, as is the case in agriculture, and to use some other term when the conditions of genuine project activity do not obtain.

CONCLUDING STATEMENT

It has been accepted, in the implications of the above discussion, that the project method is not a panacea for teaching ills. As a device for a special purpose, it must be subjected to the same tests of good teaching as are other devices. In the teaching of agriculture, the project is thought of as a real unit of activity in which each student really participates, and not simply as a description of another person's participation. The discussion has brought out the following facts: projects are highly motivating in their appeal to youth; they afford a wide range of opportunity for the expression of initiative and judgment; because they are concerned with complete experiences, they afford a particularly effective means of organizing thought; and, since they arise in activity and proposed activity, they have their beginning and their end in the application of truth. An additional aspect of the project, that expressed by the question, "Does the project afford discipline?" though really included in the other aspects, has been considered separately in order to emphasize the fact that project activity is experience, par excellence, for discipline from inner impulsion.

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CHAPTER XII

USING THE LABORATORY METHOD

The distinctive features of the laboratory method are as follows: (1) emphasis upon *doing;* (2) contacts with real objects and ideas; (3) an attitude of systematic observation, verification, and evaluation of processes and conditions in gaining new experience. The laboratory method first came into prominence in connection with the physical sciences. It has made a vast contribution to these sciences, and its spirit has pervaded many other types of subject matter in the curriculum. In the application of technical knowledge to practical situations, and particularly in the application of science to agriculture, the laboratory method has been considered especially appropriate. To many, scientific agriculture was originally little more than the application of science to agriculture; but now, with the present emphasis upon its vocational aspects, agricultural education is more than the application of science. It should not be overlooked, however, that the use of the laboratory method in the procedures and practices of agricultural education is exceedingly significant for vocational progress.

The laboratory method embraces at least three types of procedure, distinguished by the emphasis placed upon different factors: (1) directed observation in what is sometimes called "object lessons"; (2) carefully controlled experiments in the teaching of the scientific facts of agriculture; and (3) the practical application of science, under controlled conditions, to specific vocational pursuits, the demonstration type of procedure being conspicuous. The field trip is an illus-

tration of directed observation. The second type of procedure is illustrated by exercises showing the effects of different types of soils upon the rate and quantity of water percolation or absorption and the effects of different kinds of fertilizers on plant growth, and by the testing of seeds for protein and starch content. Exercises in testing for the time requirement of soils, testing for the density of spray mixtures, and testing milk for solids, or for solids not fat, are illustrative of the third type.

The methods of procedure in the laboratory are important. In the performance of the Babcock test, for example, a great variety of methods will be used to insure the successful outcome of the test. The teacher may lay out all of the apparatus to be used, and describe each piece. He may, in addition, demonstrate all or most of the steps in making the test. He will demonstrate the method of taking samples, operating the pipette, measuring the acid, adding the acid to the sample in the testing bottle, mixing the acid with the milk, whirling the centrifuge, adding water, and reading the tests. This, of necessity, would be a lecture-demonstration, since telling is a necessary supplement to this sort of demonstration. Instead of the demonstration, the teacher may depend upon a ''job instruction sheet'' and the performance of the test by the individual pupil without any demonstration.

In connection with the test, the teacher will either speak briefly on the significance of the Babcock test or direct pupils to study available bulletins and books on its significance. The telling method is sometimes appropriate in pointing out to high-school pupils the social and economic significance of studied facts, which text-books and bulletins fail to contain. In this connection the *appreciation* values of this test are emphasized. Since the *acquisition of skill* is likewise an objective, the teacher lays out the plan for the repetition of the test, primarily for the acquisition of skill, and incidentally for the refinement of the pupil's knowledge of the test itself and of its significance to the vocation.

The above illustrations suggest certain things that the teacher of agriculture should do in choosing the laboratory method as the most appropriate way of proceeding in a given teaching situation. These are as follows:

1. Determining the purpose of this method of teaching.
2. Insuring naturalness in the sequence.
3. Providing simple technique.
4. Providing for overlapping of methods.
5. Utilizing incidental opportunities.

1. Determining the purpose of this method of teaching.—The laboratory method was developed in response to a demand for a learning method that would place the pupil in contact with real things—for the instruction of experience in contrast with the second-hand instruction of authority. Its acceptance was a recognition of the truth that certain classes of facts can not be visualized by the pupil without *real* experience, and that certain other facts will remain relatively vague unless quickened by the effects of a gripping participation in doing. Dewey says, "The first and basic function of laboratory work, for example, in a high school or college in a new field, is to familiarize the student at first hand with a certain range of facts and problems—to give him a 'feeling' for them."[1]

The teacher of agriculture should know not only that the laboratory method emphasizes the participation of the pupil in the gaining of facts, but also what is more important, namely, that such facts are to be gained because they embody the truth that is significant for the vocation. In the case of the Babcock test, for example, the laboratory work must supply a basis of reflective thinking in the processes of testing milk and a means of acquiring such skills as are needed in the occupation, besides giving the pupil an opportunity to observe the facts of the experiment. The laboratory may well do more. A certain amount of relevant first-hand experi-

[1] Dewey, John, Democracy and Education, pp. 273, 274.

ence is necessary in any field, to fortify the learner against the otherwsie false interpretations that may develop from what he must take second-hand. The laboratory provides a certain type of experience which furnishes the basis of a more judicious use of facts gained under controlled conditions. It is also a means of multiplying associations that are significant for enlarging the meanings of experience. These values, when needed in the farming occupations, make a strong argument for the laboratory type of study.

2. Insuring naturalness in the sequence.—The laboratory method should not be selected, in any given case, merely in order to conduct laboratory exercises. Its selection should mean, rather, that in the sequence of lessons the laboratory is most suited to meeting the particular demands of the teaching situation in that it supplies a developmental sequence in the series of lessons. The Babcock test has so revolutionized certain practices in the dairy industry that it has both logical and psychological sanction. It is typical of a group of experiments that form the basis of vocational up-grading. The farmer must rely upon scientific technique if he is to be more than a mere tradesman, and the laboratory method is a fruitful means of learning such technique. Laboratory work must contribute to the practical ends of the vocation and be related to broader social needs, if it is to fulfill its purpose. In fact, the laboratory exercise should be concerned with major problems, practical ends, and broad social and economic needs.

It is evident from the foregoing discussion that the scope of the laboratory is limited in its application to vocational agriculture, in high schools if not in colleges. Many of the exercises listed in laboratory manuals as agricultural exercises are, strictly speaking, not so much exercises in agriculture as in science. Eaton has pointed this out[2] in his excellent chapter on Laboratory Work. On the other hand, many exercises of the field-trip and practicum types utilize

[2] Eaton, T. H., Vocational Education in Farming Occupations. Chapter XVI.

the laboratory method in a form which is a slight modification of that used in the technological laboratory. It would be folly for the teacher of agriculture to expect to have his pupils rediscover very many of the facts which have already been discovered by others in scientific experiments. It is to be expected that the teacher interested in the scientific aspects of agriculture will find himself well occupied, for the most part, in communicating the results of the experiments of others as far as such results appear significant for the upgrading of farming vocations. This appears to be the most satisfactory way of promoting efficiency in the practice of farming. The laboratory, in its strictly scientific form, will be limited to a relatively short list of experiments in most schools.

3. Providing simple technique.—If the laboratory problems arise out of the major problems of the course of study which make them important, the technique must be kept simple, else the pupil will digress from the *purposeful* handling of these problems which are native to the vocation. "Avoid highly specialized forms of motor skill," [3] unless the occupation requires them. It is desirable to hold to the simplest expression of the experiment, and to emphasize the facts and problems of the pupil so that he will reflect upon facts and interpret them for himself.

Detailed laboratory outlines should be avoided. Most writers on the laboratory method hold that elaborate guides are detrimental to the success of laboratory work. Usually, detailed outlines introduce difficulties which obscure the essential points of the lesson. The laboratory lesson should be assigned like any other lesson. The teacher is responsible for making the assignment—whether oral or written,—and in this he is supposed to set out the main objectives of the exercise. These main points of the lesson outline should be noted as the steps in the exercises, and the notebook should be kept accordingly. Thorndike writes that "the instructive-

[3] Parker, S. C., Methods of Teaching in High Schools, p. 458.

ness of an experiment is commonly in a rough proportion to the simplicity of the apparatus used."[4] The details of the laboratory organization will be consonant with the steps already discussed in the chapter on "Planning the Lesson."

4. Providing for overlapping of methods.—It was indicated above that in, "Performing the Babcock Test," for whole milk, several methods were suggested as being appropriate to the situation. In connection with the exercise, both the demonstration and individual types of procedure were suggested. Demonstration is frequently the most economical method, as it conserves time, energy, and materials; to secure technique as a basis of interpreting results or practice for skill in using the results, or in utilizing the processes, the individual experiment is oftentimes necessary, however, even at considerable expense of time, energy and materials.

Each method of instruction is supported by many supplementary methods. The lecture-demonstration is a most valuable procedure for many types of lessons. Class discussion in the laboratory is frequently quite as pertinent as the manipulation itself. Not infrequently, the lesson may be planned so that only a part of the time is given to the laboratory, the other part being utilized more advantageously in other ways of communicating relevant facts. In brief, the best teaching plan will provide for several different methods for special purposes, even within a single class period.

5. Utilizing incidental opportunities.—The method of teaching selected determines the kind of experience the pupil will obtain by means of the lesson. In the lecture, the teacher can tell things that would not be available in any other form. The survey method introduces the pupils to the status and practices of farming in the area surveyed. Similarly, the laboratory supplies a specific kind of experience. Whenever the teacher uses the laboratory, therefore, he should make capital of the incidental opportunities occurring therein to supply a basis of forming new associations, of using experi-

[4] Thorndike, E. L., Education, p. 178.

mental methods, and of securing other similar results,—by-products of the exercise. Frequently, variations in methods furnish reliable aids for determining the varying interests and needs of pupils.

THE OUTSIDE LABORATORY

Francis Bacon, in his celebrated work on inductive philosophy, published in 1620, emphasized *investigation, experiment,* and *verification,* in contrast to the barren speculations on nature and natural processes, deduced from the inner workings of the mind. This urging of a careful investigation of nature as the source of truth was an effective contribution to the progress of science; it was the suggestion of an "outside laboratory." The modern emphasis upon conducting experiments and tests on the farm and in the field is a new development of this philosophy—the extension of this idea to the major problems of life which inhere even in practical pursuits.

The outside laboratory of vocational agriculture takes several forms. Sometimes it is characterized by the special means for providing laboratory materials and a place for conducting experiments, as in the case of the *school plot.* Sometimes it is characterized by the means of reaching the materials, as in the case of the *field trip.* At other times, it may take on the character of the exercise itself, as illustrated in the *practicum,* or of the place and the exercise, as in the *farm shop.* These special forms are not always strictly outside laboratories. The materials from the school plot may be taken into the classroom; the practicum may be conducted on the inside; the farm shop exercises are usually conducted in or near the school building. The outstanding fact, however, is that the exercise is conducted in the natural settings of the vocation itself, or in settings that are approximately similar to those in the vocation.

The *school plot* [5] has been devised as a means of meeting the requirement of local departments of agriculture for laboratory materials, and as a convenient place to conduct certain class experiments or tests. There are some arguments in favor of this arrangement. The availability of farms in the patronage area, however, has tended to eliminate such a need. Usually the farms on which the boys carry on their supervised farm practice, certain other farms where specialties or specialized enterprises are conducted, and still other farms where the extension forces of the state are making applications of certain principles of practice, furnish an abundance of materials for teaching purposes. These sources furnish opportunities not only for growing materials for use in the inside laboratory but also for conducting experiments and tests, such as the ear-to-row test for corn, the tuber-unit test for potatoes, variety studies of regional crops, and other similar studies. This latter plan, always available to the enthusiastic teacher, creates a situation that is more closely typical of the agricultural conditions of the region.

The *field trip* may or may not be used to meet laboratory objectives. A trip is taken to the field in order that conditions not attainable in the inside laboratory or in the school plot may prevail in the teaching situation. A large number of exercises connected with maintaining the fertility of the soil are of this type, though many such exercises may well be conducted in an inside laboratory. Insofar as farms are used for experiments and tests, the function of field trips is identical with that of the school-plot type of outside laboratory. The field-trip type suggests a rather less well-organized laboratory exercise in which the trend of emphasis is upon observation and upon certain aspects of agriculture other than the strictly scientific.

[5] A school plot is a piece of land, from ½ to 2 acres, used by the teacher of agriculture for the purpose of supplying the means of objective teaching and of economizing time in class instruction. The work is to be done by teacher and pupils. It is designed to embrace the research, extension, and teaching aspects of agricultural problems.

The *practicum* is that sort of laboratory exercise in which the dominating emphasis is upon the acquisition of skill in the operations of the farm. While it is not assumed that these exercises meet valid vocational needs, the following are suggested as typical practicums of the laboratory type: the Babcock test for whole milk, where individual skill is required; spraying fruit trees; culling poultry according to points; treating potatoes for scab; mixing fertilizers. The non-laboratory type of practicum is much more common in vocational agriculture and is discussed in the following chapter.

The *farm shop* provides for the gaining of shop experience under laboratory conditions. The principal opportunities in the shop for exercises of a scientific character relate to farm machinery and to the use of the usual farm tools that must be manipulated. For the most part, exercises in plumbing, pipe-fitting, tinning, farm blacksmithing, and electric wiring are given with a scientific approach. The study of pumps, motors, engines, requires the scientific method of procedure. See Chapter XIII for further discussion.

In this chapter, it has been purposed to emphasize the importance of the scientific method in the study of agriculture, to show how the laboratory method became the dominant form of this study, and then to show how the form was modified to embrace studies in which other methods were used.

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CHAPTER XIII

UTILIZING SPECIAL DEVICES

In addition to the project, there are other special devices particularly appropriate for use in teaching agriculture. The *survey*, the *practicum*, the *farm shop*, and the *field trip*, the most common of these, are given special consideration in this chapter.

THE SURVEY [1]

The survey is an expression of a wider utilization of farm and human resources than the character of the project method usually permits, since the total number of projects which the pupil can carry out during the period of his high-school training must be limited, especially as he is only a part-time farmer. Moreover, the project, though furnishing an excellent basis for participation in farm activities, is not a complete substitute for active participation in productive operations, such as the school farm supplies to the few who attend schools where such farms are a part of the school equipment; nor is it a substitute for the apprentice experience which full-time farming affords.

The reorganization of agricultural instruction in the public schools has brought about a recognition of the need for wider experience. Such experience must include not only familiarity with the business and productive aspects of all of the enterprises of the home farm, but also a utilization of the experiences of the best farmers of the community. As the laboratory method is a recognition of the need of first-hand experience

[1] See Chapter VI for the use of the survey method as a basis of curriculum and course making, also farm studies, p. 243.

in experimenting and testing to secure a basis for interpreting scientific ideas, the survey offers a similar opportunity of gaining the knowledge of practices on typical farms as a basis of effecting intelligent decisions in the business and production aspects of farming appropriate to the particular farm.

The survey has two main uses: One may make (1) a survey of the farm, its crops, its animals, its markets, its roads, and its several business and community relationships, for the purpose of discovering the status and tendency of farming as a basis of determining *what* to teach; or (2) a survey of the farm and relevant factors in farming for the purpose of discovering a basis for the general organization of instruction and for the determination of the most satisfactory methods of procedure. The survey of the farm and the factors affecting it has already been discussed.[2]

A survey of the farm practices of the patronage area, followed by a survey of the wider range of practices which have a bearing upon local farming, supplements the first type of survey and supplies the essential key to the methods of procedure in teaching, at least at the beginning. The following case is given to illustrate the use of the survey as a method of teaching.

Case 1. A class of 15 boys were studying the poultry enterprise. They were taking up the job of *hatching chicks.* They had used the survey method before in this enterprise, first in connection with the opening lesson relating to the extent of poultry production in the patronage area. In this connection they had studied the census and had found that there were 157,171 chickens on the 2550 farms of the home county, an average of above 60 to the farm. They had found also that the home county ranked thirty-second, one below the median[3] county of the state. As a result of a farm-management survey of 58 farms taken in a township which fell within this patronage area, they made the following statement, based upon complete returns of the business of the farms for the year, "Poultry seems to be getting a strong hold in this particular section."

From the local survey records of about 150 farms—almost 50 per cent of the total farms in the patronage area—taken by the teachers over

[2] See Ch. VI, p. 109. [3] See Chapter XV, p. 345.

a period of four years, 124 records which showed sufficient accuracy for statistical consideration, had been summarized and the results were utilized in instruction. They had found the distribution curve[4] for chickens on the 124 farms. (See Fig. 7.) They had found that the modal-sized[4] flock was the "50-to-100-bird size"; that practically 75 per cent of the total birds kept were in flocks under the "300-bird size." They had checked their home flocks against the figures on the 124 farms.

The teacher with the aid of his pupils worked out a series of questions which related to the four main factors of the unit: (1) deciding upon the means of hatching; (2) providing the

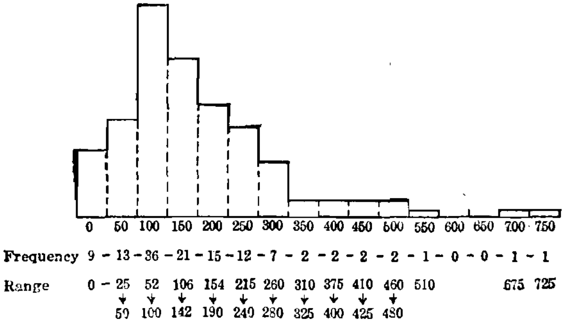

FIG. 7.—Bird-size Flocks on 124 Farms.

hatching eggs; (3) selecting and operating the incubator; and (4) operating the incubator for the hatch:

1. How many use hens for hatching? Incubators?
2. How many chicks is it proposed to hatch?
3. If hens are used, how selected? What breeds?
4. When is hatching to commence?
5. Arguments for hens? For incubators? For both?
6. Points to be regarded in selecting eggs for hatching? Why?
7. How hatching eggs are stored? Details?
8. How long held before incubation?
9. Extent home eggs are used? Purchased eggs?
10. Makes of incubators used? List? Capacity? Extent used?
11. Location of incubators?
12. Customs hatching? Prevalence? Type of incubator?
13. Dangers from incubation? Fires?
14. Pedigree-hatching? Cases? Methods?

[4] See Chapter XV, p. 343.

To economize time, this survey was planned as follows. The study was limited to 30 of the farms in the patronage area, conducted by 15 of the best poultry raisers in the modal group, the "50-to-100-bird size," and 15 of the larger poultry raisers who had adopted the most progressive practices. One of each type was assigned to each boy, according to convenience of location. One preliminary period was given to a field trip to a prominent poultryman who kept the 675 birds, as reported in the survey, in order (1) to familiarize the pupils with the procedure of the survey, and (2) to observe the facts and practices involved.

Hamlin,[5] in an article on "Some Illustrations of Effective Use of Farms and Farmers in Teaching Agriculture," pointed out how progressive teachers were utilizing farm studies for purposes of instruction:

> A breed of Belgian horses was available for study through the coöperation of a breeder of forty years. In another instance eight local herds of swine made first-hand study not only possible but exceedingly valuable through the coöperation of the breeders. In this case "an analysis of the hog raising business was made by the class. A survey form was devised and the class proceeded to visit the farms and farmers. This gave them a rather detailed statement of the owner's methods of breeding, feeding and managing hogs. . . More functioning hog information was imparted to that class in eight days of farm visiting than is ordinarily taught in many weeks of class work."

Banks,[6] in an article on "Community Service," said:

> In trying to meet the needs of the farmers, a survey of dairies was started, and it has progressed quite well, with the high-school agricultural class gathering data on land, buildings, stock, sanitation, and production. The coöperation of the farmers has been excellent, and it is hoped that some interesting facts may be secured from the data, besides giving the boys opportunity to observe and compare various farms.

A study of these and other cases[7] indicates certain desirable

[5] Hamlin, H. M., Department of Agricultural Education, Ames, Iowa.
[6] Banks, L. J., Instructor in Agriculture, Tranquility, California.
[7] See list under discussion of the field trip, p. 294.

points for consideration in making use of the survey method of teaching:

1. Determining the specific purpose or purposes involved.
2. Selecting farms and farmers, and other sources, intelligently.
3. Arranging in advance with farmers, or other persons who are to be interviewed or whose possessions are to be studied.
4. Assigning pupil responsibilities, in making the survey, in accord with abilities.
5. Utilizing previous experience in survey and other studies.
6. Developing in advance a list of relevant questions on farms.
7. Planning to economize time.
8. Integrating with the teaching plan.

1. Determining the specific purpose or purposes involved.—The purpose of the survey is always implied in the purpose of the lesson. The survey is a means to an end. As a basis of the four exercises in hatching chicks, of the lesson on raising Belgian horses, or in presenting lessons in dairying, the survey method was used to get further common broadening experience as a basis of class instruction. It was used to multiply contacts with farmers and to note the different ways in which they do things, not only on the productive side, but in business procedures and practices. It furnished opportunity for a maximum participation in the solution of problems. It gave reality to problem-solving and prepared for the more intelligent use of books, bulletins, and charts, on one hand, and decreased the use of fruitless "trial and error" on the other. It utilized variation in practice as a thought-provoking stimulus and provided an economical base for instruction in the common experiences of the pupils.

2. Selecting farms and farmers, and other sources, intelligently.—The teacher must draw upon the resources of the

community in order to furnish "natural settings" for instruction. Most of these resources will be found on the farms and in the experiences of farmers; however, the store, the market place, the public sale, the local elevator, the warehouse, the creamery, and a score of other businesses are equally significant for certain lessons. In choosing these resources for teaching purposes, the teacher must keep certain points in mind: (*a*) The farms should show common problems with differing methods of solution, since commonness of problems gives stability and difference stimulates evaluation of meanings. (*b*) The farmers on the farms chosen should have a record of relative permanency. This assures a stable basis of practice which reflects local conditions correctly. (*c*) These selections, whether of farms or of other places, should extend the teaching resources of the department in specially desirable directions. (*d*) The farmers and others utilized for study should make a definite contribution to the instruction; for example, the man who had raised Belgian horses for forty years was a valuable asset to the department on account of his tested experience. (*e*) Judicious choice of outside resources frequently eliminates the necessity of purchasing certain equipment for the department, thus reducing equipment costs, as illustrated in the use of poultry plants for the study of incubators and incubator practices. Incidentally, such utilization of resources provides a better teaching situation. (*f*) The selections should serve to promote right school-community relationship. In summary, selection of resource materials of this kind should be planned to promote efficiency in teaching the particular lessons which depend upon cognizance of broad community practices for sound judgment.

3. Arranging in advance with farmers.—Farmers and other persons whose personal coöperation is desired, or whose places of business are to be utilized for class work, have certain rights which should be respected. The wise teacher recognizes this early and, throughout his whole program of building courses and teaching, he takes the farmers, merchants and

other members of the community into his confidence. There is a two-fold advantage in so doing. In the first place, it is businesslike and appeals to the farmer as a mark of courtesy; and, in the second place, it makes it possible, through mutual understanding, to pool the resources of class and farm with the least loss of time.

4. Assigning pupil responsibilities wisely.—The value of the survey depends upon maximum pupil participation. In assigning specific places or persons for observation or interview, the interests, capacities, and needs of pupils should be kept in mind, if motivation, which is essential to all good teaching, is to be secured. In every individual visit made by the pupil, the element of difference of experience and practice should be conspicuous in the exercise.

5. Utilizing previous experiences.—It was pointed out in Case 1 that the survey method had been used in several lessons in the poultry enterprise before the lesson on hatching chicks was begun. The specific community resources had already been utilized, so that an apperception basis for studying practices in hatching chicks was available at once. Frequently, it is worth while to anticipate for a considerable time in advance the survey needs of the class and accumulate data incidentally while accomplishing some related purpose, in order to economize time. Then, too, the experiences of pupils should form a partial basis for determining the need for further broadening experience.

6. Developing in advance a list of relevant questions.—The above five points will have their best expression in a list of questions or in the data forms, which teacher and pupils formulate and use. They will have been made up by teacher and pupil together on the basis of the purpose to be served, and the interests, capacities, and needs of the pupils, and in relation to the right use of certain carefully selected community resources. They will, therefore, be the expression of the sort of experience needed to solve the problems involved in the lesson.

7. Planning to economize time.—The survey lends itself readily to a large expenditure of time, even to waste. Not all of the elements of difference in experience desirable for establishing meanings can be secured by the survey method. This would mean continuous, or all-time, teaching in the field. It is necessary, therefore, to emphasize both basal and incidental surveys. A few cases, as a rule, may be selected to illustrate most of the practices with the more striking variations. Other cases, showing slight differences, perhaps in particular practices, may well be observed incidentally; that is, they may be observed on a trip designed primarily for another end, but furnishing opportunity to observe with slight use of time and energy what would not justify a special trip. The teacher must be responsible for determining the relative values of trips in a series. In the assignment of pupil responsibilities, economy in the expenditure of the pupil's time is a question of considerable importance.

8. Integrating with the teaching plan.—The survey is a part of the lesson plan and should therefore conform to it. There are many chances for digression. Personal contacts with farmers and others, who seldom take the school point of view, often ramify into interesting paths, but these are often by-ways. The teacher's plan must be sufficiently clear-cut and businesslike to thwart any serious digression. However, as indicated above, the survey trip must be utilized frequently for incidental purposes on account of the amount of time involved and digression may therefore be justified at such times. A statement by a teacher will serve to illustrate this point. In making the preliminary arrangement for a trip to Mr. Hibbard's, the teacher said, "On our way back from Mr. Hibbard's, we shall stop to examine the 'trial pasture plots' at Mr. Morton's which the Extension Division of the College of Agriculture is promoting." If this incidental survey of Mr. Morton's pasture plots had not been connected intimately with the program of lessons, digression and waste of time would have resulted.

THE PRACTICUM

It has been observed that the laboratory method of teaching embraces exercises leading to the acquisition of skills as well as to the observation and investigation of meanings of processes, conditions, and results involved in getting new experience. In such application aspects of the laboratory exercise, practical pursuits are usually the stimulating influence. Such exercises lose most of their laboratory character and take on more of the character of the vocational practices in which the applications are significant. An exercise of this type is called a practicum. The teaching of agriculture, since it deals so extensively with practices, either for manipulative dexterity or for sound decision, reveals a host of situations where the practicum is most appropriate.[8]

In the discussion of the Babcock test as a type of laboratory exercise, it was pointed out that whether or not the test would be repeated would be determined by the need of this test in the occupation of dairying in the community. If the occupation required skill in the operation of the Babcock test, it would be repeated as a practicum. This is a common type of practicum and is further illustrated in culling, caponizing, and killing poultry; in pruning, spraying, and fertilizing apple trees; in treating seeds for smut and other diseases, selecting seed in the field, and eradicating obnoxious weeds; in all the skills such as plowing, cultivating, mowing, with which farm work abounds.

A somewhat different type of practicum in managerial jobs is not uncommon. This type of practicum problem is inherent in the management of an enterprise or in handling a large phase of the enterprise. Montegut[9] cites such a case in an article on, "Linking Class Instruction in Agriculture with the Agriculture of the Community." He undertook to remedy a bad condition of fruit trees in his patronage area. His

[8] *See list under discussion of the field trip.*

[9] Montegut, J. O., Teacher of Agriculture, Reserve, Louisiana.

class made an extensive classroom study of insect pests that attack fruit trees; collected specimens of diseased parts and brought them in for identification and labeling, with suggestions of methods of control. They "made during the past session approximately seventy-five gallons of stock solution——." "With two field demonstrations in the making and testing of this spray, the boys became very efficient, and used the hydrometer with much accuracy and skill, as judged by the efficacy of the results obtained." They did community work of pruning, "worming," and spraying. The hog cholera problem was attacked in the same way.

Similar exercises have been carried on by other teachers in a great variety of forms. In an engineering problem on buildings, one teacher had the class assist a farmer in locating and planning his buildings, in figuring bills of materials, and in the construction work. In another case, the class designed a poultry house and helped with its construction. Judging contests furnish abundance of opportunity for practical experience, particularly in the judging of animals.

The practicum is clearly recognized as a device for furnishing training in the skills that do not fall within the routine experience of farm, and is supplementary to the supervised practice. Regard for the following points will aid in making the practicum effective:

1. Selecting genuine practice settings.
2. Taking account of the limitations of pupils.
3. Deciding upon standards to be reached.
4. Conducting the exercise on a business basis.
5. Supervising carefully the launching of practice.
6. Checking results.

1. Selecting genuine practice settings.—The use of school time for practice in the acquisition of skills is justified from two angles: (*a*) the practice is essential to the understanding of certain principles which the pupil must know; and (*b*)

the practice is essential to efficiency in the occupation which the pupil is studying. Some of these practice settings can be produced in the laboratory as well as outside; some can be produced only outside. Practice with the Babcock test can be obtained in the laboratory quite as well as outside, if not better, but pruning for the purpose of renovating an old apple tree must be done outside. These two illustrations suggest two considerations: (1) some practice with the Babcock test is essential to an appreciation of the principles of the test, such as intelligent farmers may well possess, but the occupation may or may not demand the practice for skill in performing the test; (2) the principles involved in the renovation of an old apple tree may be learned well enough from the observation of results of pruning, but practice is the only means of acquiring skill in pruning old apple trees that the conditions of the home orchard afford.

Furthermore, genuineness of setting implies that the practice must relate to skills desired in meeting specific lesson objectives. One of the outstanding misuses of the practicum, from the standpoint of the course of study, has appeared from time to time in judging contests. Frequently, pupils are motivated more by the "trips" than by the judging itself. Again, the judging contest often bears no relation to the course; for example, a certain teacher took three full weeks from his course in dairying to train his boys in judging potatoes in preparation for a contest. The judging practice sometimes bears no intimate relation to community needs, and it often causes the legitimate work of the regular course to be laid aside temporarily. Moreover, not all judging contests employ the *real* judging methods consonant with good farm practices. A further difficulty is the poor pedagogical methods of learning used in the practice, since the objectives relate to more or less artificial situations where prizes and honors become the chief ends. A genuine setting is of the type that makes the pupils feel the reality of a vocational situation and gives significance to the principles involved, the mastery of which

raises the level of both vocational efficiency and individual satisfaction.

2. Taking account of the limitations of pupils.—At the beginning of instruction in any course, practice should be related to the activities in which pupils find ready responses. These, as a rule, will be the practices that are more significant socially and are related directly to pupils' practical pursuits. The weakness of the judging contest, for example, as the basis of practice, may lie in the lack of balance between the rigorous demands of practice in judging and the easy motivation through the "trip." The first practicums in a course should be relatively specific and should lead directly to appreciable results.

Pupils are limited in at least two other directions: (*a*) in the possession of the abilities required to perform certain tasks; and (*b*) in obtaining opportunities to perform these tasks. The former limitation depends upon the ability possessed by the pupil, at any given time, to achieve the minimum standard of efficiency which the vocation demands; the latter depends upon his finding a chance to use his ability. Eaton[10] raises this question, "Shall we set the boy to breaking sod with a green team, because that is a situation which he is likely to meet in the vocation?" This is a chance we hesitate to take because of the boy's possible lack of ability to perform the task. We may hesitate also because we are concerned about the team, the plow, and the plowing. In this case both of the above points are illustrated. There are certain jobs on every farm,—many on some,—which are beyond the abilities of high-school pupils; on the other hand, there are many more jobs which are not entrusted to pupils of high-school age largely because failure in their satisfactory performance may involve the operator in economic loss. Such practicums involve opportunities for decisions which are usually deferred beyond the high-school period.

Practicums requiring a high degree of skill should, as a

[10] Eaton, T. H., *Vocational Education in Farming Occupation*, p. 163.

rule, be deferred until the experience of the learner has been well broadened, that is, until the later years of the course. If limited to a few persons because of specialization in a given enterprise, the demand for a higher degree of skill may well come earlier. Again, if it is likely that pupils will drop out of the school before the completion of the course, greater emphasis may well be placed, early in the course, upon the acquisition of certain skills that are particularly desirable in the vocation.

3. Deciding upon standards to be reached.—The above consideration of the abilities and opportunities of high-school pupils implies the setting up of appropriate standards for the practicum. The purposes of certain practicums may be realized in the successful performance of a trial exercise; others require repetition of the exercise either for a refinement of the appreciation of principles or for the skill that the vocation requires, or for both; still others, involving more complicated tools and higher degrees of vocational skill, may well require a long series of practicums and possibly also a later period of practice after time has elapsed. This means that the teacher must decide what standard of efficiency shall be made the goal, first for the class as a whole, and then for individuals whose situations vary from that of the group. If, for example, the Babcock test for whole milk must be repeated for the appreciation values inherent in the practice, all members of the class can meet the standard rather quickly. If, however, the standard implies ability to test milk fairly accurately at the home farm for the purpose of up-grading the herd and for check against dealers, the practicum exercise will need to be repeated until such accuracy is attained. Again, if certain pupils desire to prepare to test herds, additional practicum exercises will have to be carried out, either under the supervision of the teacher or some other competent person, or independently. The main point is that the standards be set as a basis (1) of economical practice and (2) of measuring results.

The following case illustrates the administration of a class where a great variety of interests was apparent. Three boys had projects in beans and wished to perfect skills in bean raising. Two had cabbage. Four had potatoes. Two had corn. One, the only pupil in the class on a farm having apple trees, had an apple-orchard project. After meeting the demand of the activities required in growing and handling beans, cabbage, potatoes, and apples, the boys were divided for the perfection of a higher degree of skill according to their respective interests. During this period of individual instruction, the pupil with the orchard project worked with an expert orchardist for five days, gaining experience in mixing spray material and handling the spray outfit. Later he had opportunities to carry out other practicums. The other pupils followed a similar method of gaining experience. A record was kept of the special types of skills each pupil undertook to perfect and the degree of skill each attained in the activities carried on.

4. Conducting the exercise on a business basis.—Because of the abundance of freedom that the practicum involves, strict business principles must be followed in conducting it. (*a*) The practices must be set up with the idea of economizing time. This means a "strenuous drive" during the period of the practice, especially for the out-of-doors practicum. Discipline is maintained only by vigorous action. (*b*) Vigorous action is based on an intelligible plan, and, therefore, teacher and pupils must have a clear understanding in advance of what the exercise is to be, what standards are to be reached, and how the exercise is to be carried out. The lesson plan should provide for this. (*c*) Arrangement must be made in advance for the setting, so that conditions will be favorable for learning. This involves the selection of place, equipment, possibly additional helpers, and any other conditions essential to the exercise, such as grouping of pupils and division of work (*d*) Demonstration, for the most part, should precede practice. (*e*) The teacher should plan for the pupil's record

of the practice and see that notebooks suitable for work under variable conditions have been provided.

5. Supervising carefully the launching of practice.—It has been said that practice makes perfect, but this depends upon (*a*) the correctness of form of the practice and (*b*) the ability of the individual to reach the standard of perfection agreed upon. The pattern should be correct, therefore, and the pupil should undertake his work with a favorable attitude and with ability to achieve the desired goal. It is important that the practice be launched with the greatest possible momentum, according to correct pattern, so that success may be predicted. Freedom to practice without supervision is safe only if the right forms are being followed. The effects of incorrect practice are difficult to eliminate.

6. Checking results.—The results of practicums must be checked strictly, (1) to obtain an accurate evaluation of accomplishments, and (2) to maintain a desirable disciplinary standard. It is very easy to waste time and energy in practicums where no adequate checks are made. If the teacher has proper regard for the five points mentioned above, the checking of results will present little additional difficulty.

THE FARM SHOP [11]

The farm-shop exercise is a practicum. While not all of the work classed as farm shop work is performed within the four walls of the shop, it does stand for a shop type of procedure in dealing with certain problems of repair and construction. Two special features of the farm shop are: (*a*) that it may be correlated as a "service" exercise in meeting certain types of objectives in courses and curriculum, and (*b*) that it is conducted in a convenient place, the shop or elsewhere, following the practical procedure of shop methods. What has been stated, therefore, in connection with the labora-

[11] The reader's attention is called to the list of references on the farm shop at the end of this chapter.

tory, the survey, and the practicum, applies to the conduct of farm-shop exercises and projects generally.

The following types of exercises are suggested as indicating *the scope of the content of the work, from which selections* are to be made in keeping with the purpose, or purposes, of the farm-shop instruction. These items are gathered from lists made up from surveys of farms, either in larger or smaller areas. While no responsibility for the accuracy of the list is assumed by the authors, the items are presented as typical of what one finds in the discussions of the farm shop.

Repair of harness, selection, care and use of hand-tools, saw-filing, rope work, tin work, woodwork construction, woodwork repair, drawing, care and repair of farm machinery, soldering, farm carpentry, repair of pumps, adjustment and repair of motors, hot and cold metal work, electric wiring, pipe fitting, repair of plumbing, concrete work, belt lacing, water-supply systems, heating systems, sewage-disposal systems, gas engines, painting, horse shoeing, etc.

The following are important points to consider in connection with the use of the farm shop:

1. Setting out clearly and definitely the special purpose or purposes which the farm shop is to realize.
2. Integrating whatever is offered with the problems of the courses in the agricultural part of the curriculum.
3. Conserving time wherever possible.
4. Planning to check results accurately and faithfully.

1. Setting out the purposes clearly and definitely.—There is much confusion as to the purpose and the organization of the operations and decisions appropriate to the farm-shop type of instruction. This has led to difficulties of one kind and another in handling the work satisfactorily. This lack of clearness and definiteness has been due largely to the following causes: (*a*) The first teachers of farm shop were trained largely for manual training, or they had had no suitable training. The emphasis tended to be placed upon tool

processes and the execution of formal patterns. The teacher of agriculture, frequently untrained in either manual training or shop, did the best he could but spent his time in many wasteful time-consuming practices under miscellaneous standards. (*b*) Courses of study in agriculture were organized with the shop added somewhat as an adjunct; thus its method grew up more in accordance with the organization of shops and less in keeping with the needs of the agricultural instruction. (*c*) There was no adequate knowledge of the scope of exercises or projects appropriate to the needs of the farmer. (*d*) There was no satisfactory basis of allotting time for general or special exercises. Within the last few years, much progress has been made in removing these difficulties.

One outstanding defect in most statements of aims or purposes is that little or no attention is given to the vocational point of view. The following is a statement of the aims set for the State of California: [12]

> To teach each boy to select wisely, use and care for all tools necessary to do the farm construction and repair work.
>
> To develop good judgment by study, contact, and experience, in the selection, operation, and maintenance of farm machinery and appliances.
>
> To teach the reading of plans and drawings of farm buildings, appliances, and machinery; and to teach such farm drawing as will prove profitable or useful to the farmer.
>
> To have a well-equipped and arranged farm shop at the home of each boy.

Field, in an unpublished manuscript,[13] observes, correctly, "In the hands of teachers with the right point of view with respect to the objectives for instruction on the vocational basis, these objectives can no doubt be redefined in terms of the specific needs of any boy." The difficulty that is en-

[12] Agricultural Education Series No. 2, Division Bulletin No. 11, "Farm Mechanics for California Schools," The University of California, The State Board of Education Coöperating, Berkeley, p. 7.

[13] A very valuable contribution on Farm Shop Work in the Program for Vocational Agriculture in the Secondary Schools, by Professor A. M. Field, University of Minnesota.

countered resides usually in the teacher's inability to maintain the right point of view when the objectives are stated with so much emphasis upon incidental outcomes rather than upon genuine objectives.

It would seem, therefore, that the purpose should be stated in terms of the desired changes in attitudes, knowledge, and skills which relate and contribute to the performance of operative jobs and to the making of decisions required in the enterprises in which shop jobs are essential. For example, in carrying on the hay enterprise, the ability to grind a sickle, to put new sections in a sickle, or to repair the mower pitman, may well be a valuable asset at a particular time. The acquisition and cultivation of this ability is related fundamentally to the haying enterprise. If these shop jobs are taught, they should be taught because of this significance, and not—as one writer has said in defining shop purposes—because they have training value, are attractive to farm boys, or may keep farm boys in school.

When the vocational point of view is clearly in mind, emphasis may be placed upon the use and care of tools for performing the ordinary jobs of construction and repair, commonly done on the farms of the more progressive farmers. Farm shop work also includes the development, in connection with farm jobs, of the ability to construct and repair certain appliances commonly constructed or repaired by the more progressive farmers. It includes also experience in the management of farm machinery, vehicles, and other mechanical devices and contrivances, and such construction and repair of the same as would be justified in the light of community experience and the facilities of the home farm. Other shop exercises, such as drawing and computing, should not be omitted, if they contribute to the economical *carrying on* of farm enterprises.

2. Integrating shop work with enterprise problems.—It has been emphasized that shop work should contribute to the solution of the enterprise problems, in both operative

and managerial jobs. To accomplish this satisfactorily, several factors must be under control. (*a*) A survey of what farmers do forms the basis of the selection of shop exercises, problems, or projects. As the teacher of agriculture learns from the survey what type of farming prevails in a given patronage area, or what enterprises are carried on, and utilizes this information in curriculum or course making, so the teacher may use the survey to determine what shop work is most appropriate for a given type of farming or for a given enterprise. What farmers do forms the basis of selection; what the successful farmers do, why they do it, and how they do it, constitutes the basis of the conduct of shop work. This implies, first of all, the recognition of the dominant farming enterprises. (*b*) Integration is impossible unless the needs of the particular individuals are known and regarded. Some of these needs can be satisfied in common shop problems; others, which minister to the particular requirements of project and other home responsibilities, are more difficult to satisfy. (*c*) Opportunities for learning at home are many, especially on certain farms. Two points are worthy of consideration in this connection: the ability and disposition of the parents to give opportunity for training, and the selection of such shop work as contributes to a better conduct of the home enterprises. (*d*) Organization of the work should be on the basis of the whole course. This takes two forms: first, such preliminary or fundamental instruction in making simple appliances as will give "at homeness" with tools and materials; and, second, the distribution of the work in the enterprise activities where its contribution will be direct. No satisfactory study has yet been made as to such distribution of shop work. It is clear, however, that in the past it has been too much detached from the primary jobs of the farm. (*e*) The work that is most typical of the enterprises and of the processes involved should be selected. This provides for economy of effort and a maximum of "transfer" value in what is done.

3. Conserving time.—*Shop work tends to become time-consuming.* This is one of its dangers. There are several safeguards against such waste: (*a*) A time-allotment must be worked out, first for total amount of time, and then for the special exercises. This must be planned in keeping with the other factors of school organization discussed above. (*b*) businesslike and orderly procedure must be insisted upon during the period to prevent aimless or indifferent work. Nothing promotes discipline so well in this type of work as an exacting procedure. Proper shop clothes, proper shop housekeeping, and lively action should be required. It is better to have 30 minutes of ready and vigorous performance than 90 minutes of dilly-dallying. An exceedingly important thing, then, in saving time, is the careful determination of the degree of skill desired. The value of skills is always relative; also, the difficulties of acquiring skills are seldom in proportion to their values. These facts present a difficult problem, since good teachers of shop can hardly be content with securing only elementary skills in a great variety of directions. To develop high degrees of skill in a few directions tends to exalt "shopness" at the expense of the vocational emphasis. Three points aid in determining the degrees of skill desired: (1) the educational value, that is, the number and quality of the changes desired, which are most significant in the enterprise problems; (2) the intrinsic value of the articles made or repaired; and (3) the feasibility, possibility, and demand for the utilization of the constructed or repaired thing in meeting the need which prompted its construction or repair.

4. Planning to check results.—Provision should be made for checking results in a definite plan of action. Many devices have been submitted for obtaining results. It is not the purpose here to evaluate these; however, special control devices must be used where instruction is so individual in character. There are three general ways of checking results, within each of which special devices may well be used: (*a*)

expression of attitude toward this type of work in terms of what the pupil chooses to do on his own initiative, such as prizing tools and adding to his collection, providing a shop on the home farm, keeping tools in repair, and, most of all, *doing* construction and repair jobs; (*b*) ability to perform ordinary jobs of construction and repair clearly above the "bungling" level, and certain jobs with a relatively higher degree of skill; and (*c*) appreciation of the value of tools and of work and an understanding of what may be done profitably in the shop and what should be purchased or repaired outside. On these three points there should be continuous advancement through the four years of the regular high-school course.

THE FIELD TRIP

The field trip is essentially an observation trip. It may be linked with laboratory, survey, practicum, or shop, or with any combination of these; that is, field trips may be taken for any of these purposes, or for a combination of such purposes. The field trip, therefore, is essentially a device in which emphasis is placed upon "going out" to obtain teaching situations in natural settings of varied type. In addition to the illustrations already given, the following examples of the use of the field trip, alone or as a part of an exercise, have been excerpted from an actual list of lessons:

1. Mixing fertilizers at Hibbard's.
2. Survey of fertilizer buying practices.
3. The selection and use of plows and harrows for corn and bean projects.
4. Economic study of Van Derzee's dairy (rations, feeding, production, manufacture), two trips.
5. Study of types of lumber and their uses at Adams' farm—demonstration lecture by Mr. Adams.
6. Judging a good dairy cow.
7. To show differences in prices of farm supplies in towns interior from the railroad as compared with railroad towns—a trip to Mecklenburg.

8. Shearing, grading, and marketing of winter lambs.
9. Testing soil for acidity, in the field.
10. Study of farm storage of cabbage on five farms.
11. Study of poultry houses, five farms.
12. Candling and grading eggs at Mr. Stone's.
13. Poultry Products Show (7 A.M. to 10:30 A.M.). Lecture, as a part, by Professor Bradley.
14. Certification of White Wyandottes by Mr. Ogle at the Cudeback farm.
15. Poultry Farm for Winter laying at Hibbard's.
16. Winter management of laying and breeding flocks at Scott's.
17. How to manage layers and breeders during month of January at Lane's.
18. Selecting land for project at Richards', incidental to a project tour.
19. Weighing corn from ear-to-row test from a special plot.
20. Selecting 8-row yellow corn at McClellan farm.
21. Renting a farm from Mr. Richards. (Exercise staged.)
22. Boyer to select 20 pullets for E. Reynolds' project, incident to project tour.
23. Project tour—Richards, Niemi, Hardenbrooks, Reynolds.

SUMMARY

The salient features of the special devices presented in this chapter may for convenience be grouped according to: (1) the purpose and plan; (2) the intelligent selection of resource materials of instruction; (3) the adjustment of the program to the pupils involved; and (4) the proper conduct of the work.

1. The purpose and plan:

(*a*) The exercise should be an integral part of the course program, and as such should be made to accomplish a specific step in the teaching method. Incidental digressions are justified only as they serve to embrace incidental opportunities which would otherwise be lost.

(*b*) The trips should be cumulative; that is, they should reveal a developing plan that runs through the series as a conscious procedure.

(*c*) A form of survey or a list of questions, to center attention upon the specific purposes of the observations, investigations, and practices, should be prepared.

(*d*) Sufficient time should be taken in advance to arrange the field settings into genuine teaching situations.

(*e*) The teacher should decide in advance upon the minimum standards of observation, investigation, or practice, that will be required.

(*f*) There should be provided, as a phase of the plan, a scheme for checking the accomplishments of the exercise, in details taken or in interpretations made.

2. The intelligent selection of sources:

(*a*) Field studies should be arranged with reference only to such farms and farmers, or to such other resources, as furnish the basis of the most intelligent selection of teaching situations and materials.

(*b*) The use of these sources is facilitated when the arrangement is made in advance, for only by previous arrangement can definite plans be made. This is a courtesy that most farmers expect and all appreciate.

(*c*) The economical use of the farmer's time is conducive to good feeling and incidentally promotes the opportunity of extending field studies among the better representatives of the community.

3. The adjustment of the pupils' program:

(*a*) The time of the pupil should be conserved and his energy expended wisely.

(*b*) The main work should be kept within the limitations of the capacity and experience of the pupils. It is wise not to try to teach everything that the situation suggests.

(*c*) In keeping with the plan, the pupil should be required to meet the minimum standard of observation, investigation, and practice.

(*d*) Responsibility should be placed specifically upon each pupil for some special feature of the exercise as well as for a general report on all features. Incidentally, this should involve proper regard for the farmer's interests and also proper attention to the work and discipline of the group.

(*e*) Specific supervision should be given as needed.

4. The proper conduct of the work:

(*a*) Utilization of the plan that has been thoughtfully worked out is imperative for successful outcomes, unless factors beyond the control of the teacher make its execution impossible or futile.

(*b*) Supervision of trips should be made carefully, especially until the businesslike procedure which the teacher follows is understood by the pupils and practiced habitually. Individual trips may then be allowed in connection with the instruction.

(*c*) To accomplish best results where trips are necessary, therefore, vim, plan, order, and despatch should be exacted. Transportation should be arranged on an equitable basis.

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CHAPTER XIV

CONDUCTING CLASS INSTRUCTION

The choice of appropriate methods is basal to effective lesson planning. The project, the survey, the practicum, the farm shop, the field trip, and the laboratory are all especially effective devices for teaching agriculture. Good teaching involves much overlapping of these. Certain methods, particularly characteristic of classroom teaching but functioning in all forms of teaching to a greater or less degree, are presented in this chapter. As indicated, they possess great flexibility of usage. For example, questioning is appropriate to all forms of teaching, even where the lecture is used. The manner in which the question should be used does not depend primarily upon the particular question-and-answer form selected, but rather upon the purpose that the question and its answer are supposed to serve in the instruction at the time.

These methods are called classroom methods because they function largely in the teacher's management of the class. It has been our custom to think of the class as meeting in the classroom, though classes may and do meet outside. There are many factors involved in teaching agriculture that may make it necessary to prepare to conduct the majority of the teaching exercises at the school. This chapter will be limited to a consideration of (1) discussion, (2) demonstration, (3) directed study, (4) lecture, and (5) examination.

TEACHING THROUGH DISCUSSION

Discussion is a common procedure in teaching, for, whatever method is used, learning involves a give-and-take series

of reactions. Discussion is an essential part of the processes of *presenting* one's reactions, *interpreting* new ways of acting, new ideas, or new ideals, and *illustrating* and *verifying* them. It is because of these functions that discussion becomes a method of teaching. The word "discussion," when used to designate a method of procedure, determined upon in lesson planning, conveys more than its ordinary meaning, for it implies a problem to be solved and relates specifically thereto. Discussion has frequently been subordinated to the recitation,[1] but it stands out with sufficient distinctness, as a way of facilitating learning, to become a type procedure.

In a certain class under observation, the class period opened at 9:05. At the close of the previous class period, it was learned, the teacher had announced that the problem to be considered the next day was, "Methods of improving seed corn." The class had been told to observe and inquire concerning the methods being used by farmers in that area in selecting seed corn.

The class opened with *discussion* of the common practices of farmers. James Gordon, who was called upon, reported selection (1) from the crib and (2) from the wagon at the time of husking. George Brown volunteered that his father used a seed-corn box fastened on the wagon where desirable seed-corn ears were placed as they were husked. William Jones said that his father selected his seed corn from the crib but tested it under sod in the spring. He explained this method in detail at the request of the teacher. Others spoke of testing methods used. Utilizing these points, the teacher focused attention again upon the problem, announced the day before by writing it upon the board. (He could have saved the minute used, since he had the problem at the head of his mimeographed sheet for directed study; however, it held and concentrated class attention upon the problem, and therefore appeared entirely justifiable.) Altogether, this consumed twelve minutes.

[1] The term "recitation" is not used in this volume as connotating a method of teaching. This term is a survival of the days of "Hearing lessons." Its essential meanings are involved in the other methods. The *lesson* is a most logical substitute for it, since it embraces what *recitation* has been used to convey by most writers in recent years. It has been retained by writers largely as a name for the lesson period in which recitation may be missing entirely, or at least of only minor significance.

A few minutes were given to the importance of the seed-corn problem: (1) by eliciting from pupils certain facts, and (2) by calling their attention to a table of facts to be found on the mimeographed sheet. At this point, the teacher put the sheet in their hands and indicated that the study of the problem for the morning would center in five pivotal questions: (1) selecting seed corn from the field (including crib selection); (2) ear-to-row test; (3) detasseling; (4) curing (including means and methods of storing); and (5) germination tests (including types of testers). Under each of the above questions were sub-questions for suggestions in study and the specific references. The class was given 35 minutes for study.

At ten o'clock, the teacher began the consideration of this question with the class. An analysis of what happened during the remaining 30 minutes revealed three main points: (1) The teacher consumed 11 minutes in asking questions and in making supplementary statements. (2) The pupils spent 8 minutes in answering questions asked by the teacher, which were based upon the reading reference and upon experience; and (3) the remaining time was utilized by the pupils in a constructive outlining of the principal points. Of these 11 minutes the teacher utilized 4 minutes in leading to a generalization favorable to selection of seed corn from the field.

This period was followed next day by a trip to the field. The first part of the period was given to consideration of procedures; the second part, to actual selection. The study was supplemented by individual selections of seed corn on the home farms, which was to be stored and then tested in the laboratory during the early spring months.

From the foregoing description, it is evident that in this case two dominant "controls" of teaching were utilized: (*a*) the direction of discussion by the teacher, first as a basis of assignment, and then as a stimulus to a desired generalization; and (*b*) the direction and control of study, first by the use of the mimeographed outline, and then by the supervision of study. The balance between these two "controls" was determined by the development in learning that took place; and this depended upon pupil abilities and achievements, availability of favorable teaching facilities, farming needs, and teacher preparation.[2] The other exercises to be conducted

[2] Professor J. T. Wheeler, Georgia State College of Agriculture, has written a very suggestive article on "The Best Use of the Ninety-

on improving seed corn would involve other controls, such as the laboratory and the practicum. To make the best use of discussion methods, attention should be given to the following points:

1. Correlating discussion with other methods.
2. Making discussion serve definite purposes.
3. Safeguarding discussion by using a definite plan.
4. Promoting the effective interchange of ideas.

1. Correlating discussion with other methods.—Discussion is essentially a method of correlation; that is, being flexible, discussion can be adjusted so that other methods can be utilized in the same exercise period. It was indicated in connection with the case described above that the teacher utilized the method of directed study as the basis of a more intelligent discussion which was to follow. In other aspects of the lesson, "Methods of improving seed corn," the teacher drew upon the laboratory, the practicum, and the lecture. A distinctive method may thus be developed, the lesson being characteristically of the discussion type, frequently spoken of as the *development* lesson.

In utilizing discussion as a distinctive method or in combination with other methods, it is well to recognize its main contribution to good teaching. In addition to providing for flexibility, it is perhaps the best method for organizing and utilizing the activities of the pupil. Pupils are normally self-active, and any method that provides for freedom of expression is usually effective in motivating their activities. There is the element of *striving*, which adds zest; the give-and-take of life is always interesting. The organizing function of the discussion becomes the basis not only of the development of opinion and the formation of judgments, but of the utilization

minute Period in Agricultural Instruction." Vocational Education Magazine, Vol. I, No. 7, March, 1923, pp. 496–499. This article throws light upon method-emphasis in solving problems.

of specific and varied experiences; and this forms the basis of the interpretation and evaluation of such experiences. Discussion is particularly well adapted to the teaching of agriculture, since the pupils have had a large amount of *real* experience which is available for analysis, comparison, classification, and interpretation, and teachers are able to give adequate recognition to individual differences.

2. Making discussion serve definite purposes.—Frequently the discussion method has been used as a "pick-up" method, that is, a means of filling in, on the spur of the moment, the gaps which other methods make. This leads to a number of dangers which will be discussed under the next point. There are four main purposes which the discussion method serves particularly well.

(*a*) Discussion is the logical means of clarifying an assignment. Carefully selected experiences of pupils may easily become the common base for the introduction of the new problem. The survey of farm practices in selecting seed corn and the pooling of knowledge on the importance of good seed corn supply an excellent base for the approach to "Improved methods of selecting seed corn." Further, in connection with the assignment, discussion affords leeway in making clear such points in the problem as present special difficulty.

(*b*) It is the method of directing development. If discussion is the distinctive method of the period, it provides for continuous development. Its function becomes largely, in this case, that of reorganizing the experiences of the pupils; on the other hand, through directed study on the basis of an outline, it provides also for gaining new experience. The emphasis is mainly, however, on the "working over" of experience, supplemented by the results of such study as seems to be necessary to promote reactions. When "directed study" is utilized as an appreciable part of the exercise, the combination is really the method of directed study and discussion, as illustrated in the "seed corn" exercise. Sometimes the purpose of the discussion is to discover a principle or a better

interpretation of a principle that will add meaning to specific experience; sometimes it is the application of a principle to a specific case to determine its validity in giving meaning to the specific fact or experience. In the former, development is moving in an inductive direction.[3] In connection with the "development" purpose of discussion, one must keep in mind the value of discussion as a basis of significant incidental learning. The suggestions of experience, presented in conversation or discussion, are rich in valuable by-products. These, however, are the seeds of digression in discussion, and therefore the basis of danger.

(*c*) Discussion embodies the remnant of the recitation method. In the 30-minute discussion of "Methods of improving seed corn," 8 minutes were used in testing pupils on the facts and interpretations given in the references or on experience which these questions recalled. It is clear that oral discussion in a group is an effective procedure in fixing in mind the points of the development of a problem-solving process. It supplies associations by which recollection is made possible. It likewise furnishes a basis for the reorganization of one's associations during the initial stages of learning, before fixed opinions appear. The presence of the group not only gives the discussion a social character, but also stimulates individual alertness and acumen. This has given rise to the emphasis placed upon the *socialized* recitation, *socialized* discussion, and *socialized* assignment.[4]

[3] For a good discussion of induction and deduction, viewed as the technique of thinking, see Miller, I. E., The Psychology of Thinking, Chapters XVIII–XX; also Dewey, John, How We Think, pp. 82–84.

[4] It has already been indicated that the term *recitation* no longer carries the right connotation. In this connection, the term *socialized* is really superfluous, since discussion always occurs in a social medium. The use of *socialized recitation*, for a pupil-directed discussion, merely emphasizes the principle of self-activity in class discussion. Good discussion, in that sense, is always socialized. If socialized discussion means discussion that is entirely pupil-directed, it violates the fundamental principles of good method.

(*d*) Discussion is valuable in pointing to applications. In fact, the suggestions that arise in the course of discussion, if they relate to the application of a principle, will become the bases of subsequent assignments, or of definite practical exercises. The best test of any principle is found in its application to *practice*. Laying the foundations for the testing and verification of a law or principle is peculiarly a function served by the discussion method.

3. Safeguarding discussion by using a definite plan.—The most significant requirement for realizing the values inherent in the method is to learn how to organize discussion. The dangers of digression, guessing, irrelevancy, and hodge-podge, which may accompany the freedom of the class period, can be avoided only by a definite plan. The necessity of a definite plan is even more important for discussion than for other forms and methods of instruction. The control, both of instruction and of the class, depends upon making exacting demands of all the pupils. It is a difficult procedure to handle, but its use is imperative where the development of the pupil is the core of teaching. The outline is the basis of control. It serves to prevent digression and shows the way back if, perchance, one has digressed. It determines the relevancy of facts and experiences. It prevents hodge-podge by making the teacher's statements, as given in the outline, the point of reference in the give-and-take discussion. It provides for a maximum pupil participation within the common limits set for the solution of the problem. The use of good questions also controls discussions.

4. Promoting the effective interchange of ideas.—Discussion is most arduous if conducted as it should be; but, rightly done, it yields the best teaching results. It is essentially a conversation method, and the dominant procedure is therefore that of question-and-answer. Sometimes discussion is spoken of as the question-and-answer method. Why is it that people are always asking questions? What step in human progress can be thought of that was not the result of somebody's ques-

tion? Is it not likely that we can get a relatively satisfactory measure of our teaching ability by the character of the questions we ask? The question is fundamental in communication and conversation. Communication is the most fundamental condition of the teacher-pupil relation in education. The teacher is responsible for seeing that the proper questions are used as the basis of the direction of learning, so that individual and social progress may take the most desirable directions. When questions are used as instruments of teaching method, it is for the purpose of directing the pupils to problems or to phases of problems which are either actual, imminent, or conjectural, and of stimulating them to adequate responses.

What are *good* questions? There are many types of questions, but the quality of "goodness" does not inhere in the form of the question. This is not to say, however, that the form of questions is not important. "Goodness" in questions is a matter of the appropriateness of the question for accomplishing the purpose which it is intended to serve. In the first place, the statement of the problem, in interrogative form or otherwise, is a most significant use of the question. "How can we improve our methods of selecting seed corn," or "Methods of improving seed corn," represent the most fundamental type in the class exercise (1) for focusing attention upon the problem, (2) for giving point to the study and therefore acting as a means of reference, and (3) for suggesting a possible cue for the solution. On the basis of the *fundamental* question, pivotal questions will suggest themselves when the situation has been analyzed.[5] These pivotal questions, three or four in number, are the main points in the lesson outline. Their purpose is to open up the problem through an analysis of it. The answer to one pivotal question suggests movement toward the next. In answering the question, "How can we improve seed corn," the question, "How is seed corn selected," is a basal one. "How is seed corn

[5] Recall this point in the planning of instruction, pp. 184, 185.

cured,'' is another. ''How can germination tests help,'' is another, and so on. The answer to each lends momentum to an attack on other questions of coördinate rank. If the questioning is carried further and pupils are asked, ''How is seed corn selected now,'' they may be required to find out how John Jones selects his corn, or how John Smith, or Henry Crawford, or anybody else selects it,—Smith and Crawford having sold seed corn to their neighbors at different times; or they may have to search in books and bulletins.

The first two levels of questions are definitely provided for in the lesson plan. To develop the answers to the pivotal questions on the second level, becomes the purpose of study and discussion. Abundance or lack of experience, or of content accumulated in printed matter; interest or the lack of it in the problem at issue; the teacher's preparation or lack of it; the relative importance and difficulty of the problem; the plan for distributing questions either in study or in the discussion; the selection of a proper form;—these are factors in the effectiveness of questioning.[6]

USING THE DEMONSTRATION

The approach to the use of symbols and abstract ideas in educational method is always through the medium of concrete experiences. The learner in any new field of learning, or in any new part of a field, is more at home with tangible objects than with abstract ideas. Therefore, the approach to new experience of any kind whatever should be through *real* contacts with things and people. Out of these contacts come meanings, and later, possibly, the demand for the expression of the abstract. In discharging the operative and managerial responsibilities of the farm, the farmer's contacts are made largely in situations which display the mechanical and social

[6] There are many discussions of the use of questioning in teaching. The reader is referred to the references at the end of the chapter to supplement this section which is brief by design.

aspects rather than the abstract ones. The main practices of any vocation relate primarily to its mechanical and social aspects; however, progress in the vocation depends in no small measure upon the new uses of experience in dealing with things and people, and these new uses are visioned and patterned by the aid of the abstract.

Every good lesson plan will include such illustrative materials as are essential aids in elucidating the meanings which the teacher would convey to his pupils. Bolton,[7] in discussing the necessity of objective teaching, says:

> Objective illustrations should be given *whenever the elemental ideas in any topic are not easily understood through imagination and reflection.* Their necessity is as great in the university as in the primary school.
>
> The meaning of *primary* or *elemental* ideas needs to be understood. The mind can imagine any material or any combination of material things, provided the elements have been derived through perception. Once transcend experience of the elements and blankness results. As the congenitally blind cannot image a color, nor the congenitally deaf music, a normal pupil cannot image a machine unless he has actually seen it. Object lessons are as much a part of reading lessons as of chemistry. Whenever fundamentals are lacking through experience they should, if possible, be supplied by objective illustration or pictorial representation.

It is important to recognize the extent to which learning is facilitated by objective teaching, and particularly by the demonstration, which has such universal sanction among leaders in agricultural education. The following is a suggestive list of type exercises that lend themselves well to demonstration either as a distinctive method or as a part of a combination method: the Babcock test; pruning an old apple tree; caponizing; selecting a good dairy cow; culling the non-layer; filing a cross-cut saw; soldering a tin pail;

[7] Bolton, F. E., Dean of the School of Education, University of Washington, Everyday Psychology for Teachers, p. 118.

tying a knot; operating a spray outfit; setting cabbages; testing soil for acidity. The following considerations affect and promote wider and more intelligent use of objective illustrations:

1. Choosing appropriate illustrative material.
2. Providing illustrative material in natural settings.
3. Determining relative teacher-pupil responsibilities.
4. Conducting demonstrations carefully.
5. Carrying use beyond things to meanings.

1. Choosing appropriate illustrative material.—Illustrations are valuable in teaching only insofar as they "throw light" upon the interpretations involved. The types of illustrative materials vary through a wide range. The simplest and most direct way of using illustrative material as a means of teaching is to bring the pupil into contact with actual objects, such as the corn plant, the Baldwin apple tree, the White Leghorn hen, the Percheron mare, and the McCormick mowing machine, or with such parts of these objects as, alone or in relation to other parts, convey important meanings. Examples of such parts and their relationships are the ear of corn and its location on the stalk, the branches of the Baldwin apple tree and their relation to the trunk, the pelvic bones of the good or poor White Leghorn layer in relation to keel and vent, and the feet of the Percheron mare in relation to the size of the animal.

A second type of illustration, which is very valuable for the teaching of agriculture, is the representation of an object by a picture, a diagram, a model, or similar form. Each of the objects suggested in the preceding paragraph may be represented in this way.[8] The question may arise as to the necessity or desirability of using the objects when reprensenta-

[8] The agricultural texts in The Wiley Farm Series *illustrate* the skill with which representations of objects and their relationships can be produced.

tions are available. This is a point that will be considered later in this section; however, the presumption is that, in gaining entirely new experience, the object is superior to its representation. Exceptions to this may occur when the limitations of the teaching situation are considered. For excellent uses of representations, see Rice and Botsford's "Practical Poultry Management," Chapter I, particularly pages 7-10, or Robb and Behrends' "Farm Engineering," Chapter II, pages 49-113.

The third type of illustration to choose is the demonstration. This is illustration through activity. The activity may be predominantly that of the teacher or of some pupil, or it may be the activity of all pupils as in the case of a demonstration by the class. Colvin [9] points out that the demonstration may be considered as the form of illustration used when pupils are to be made familiar with a process rather than with a thing. Usually the demonstration is so used, and therefore the distinction is probably practicable; in other words, the demonstration is a complex illustration.

Another significant point in choosing illustrative material is that of economy, both of money and of energy. Illustrative material, especially demonstration apparatus, is frequently expensive; and, as a substitute for the individual laboratory exercise, the demonstration reduces costs materially, especially where separate apparatus for individual pupils would be required. Whether or not the expense to the school for apparatus and materials can be justified in the light of the particular educational values accruing from individual laboratory exercises as compared with demonstration exercises, is a question for the teacher to decide. It has been pointed out that a more extensive use of the demonstration may well be made, especially where appreciations rather than skills are sought. Time and energy are likewise saved by the use of the demonstration. This is economy without serious educational loss, since it is foolish to spend hours performing exer-

[9] Colvin, S. S., Introduction to High School Teaching, pp. 256, 257.

cises where minutes of demonstration satisfy the ends of instruction. "Busy work" has no more place in the high-school laboratory than in the primary school. Furthermore, the demonstration may well be used more often to establish in the learner's mind a pattern of what he may carry out in the individual exercise. It thus prevents the waste of unnecessary "trial and error."

2. Providing illustrative material in natural settings.—The importance of emphasizing "natural settings" as bases of good teaching can hardly be over-stressed. This point has been stated repeatedly in the pages of this book. In using illustrative material for teaching, two procedures are open. The teacher may take the pupils to the places where the illustrative materials may be found in their natural settings,[10] or the natural settings may be provided in the school. It is evident that the former procedure is the more appropriate one for securing educational values where farm or other outside conditions are essential as a background. However, as stated before, the ingenious teacher is able to bring into the classroom situation materials—both objects and their representations—illustrative of facts, principles and processes, and to conduct there a great number of exercises in which demonstration dominates, without interfering, at least seriously, with the essentials of the natural settings. It has been pointed out already that a demonstration of the Babcock test gains no particular value by being connected with the farm or the milk depot, since the essentials of the setting can be provided in the laboratory. Demonstration plays an important part in the laboratory, field trip, survey, practicum, and farm

[10] Dewey, John. School and Society, pp. 24, 25. "No number of object lessons, got up *as* object lessons for the sake of giving information, can afford even the shadow of a substitute for acquaintance with the plants and animals of the farm and garden, acquired through actual living among them and caring for them. No training of sense-organs in school, introduced for the sake of training, can begin to compete with the alertness and fullness that comes through daily intimacy and interest in familiar occupations."

shop, and even in directing or conducting discussion where *doing* may well supplement *reciting*.

3. Determining relative teacher-pupil responsibilities.—One of the outstanding values claimed for the laboratory type of exercise is that it provides for a maximum of individual participation. The individual laboratory has been regarded as an opportunity *par excellence* for the expression of individual initiative in finding truth. In practice, the formality that has been introduced into laboratory work may prevent much of the expression of individual initiative that characterized its earlier use. When the results of teaching by demonstration are compared with those of the individual laboratory method, there appears some evidence that demonstration may be even more effective than the individual laboratory.[11]

As Works[12] has pointed out, such results as were obtained by Kiebler and Woody challenge us to determine our objectives more accurately. Among other statements on the subject of the individual laboratory, he says:

Is there not need for a clearer formulation of objectives as to what are the desired outcomes of the laboratory work? Clearly if skills and techniques are sought there must be opportunity for students to participate to whatever extent and in whatever ways may be necessary to acquire them. They cannot be secured by means of the demonstration alone although it may be a valuable auxiliary.

If, however, the end sought is understanding or knowledge as contrasted with skill, it may very well be that it is not necessary to have the amount of individual laboratory that now generally obtains. Evidently the relative importance of knowledge and skill in any given course cannot be determined until we have defined much more clearly the objectives of college instruction in agriculture than has been done this far.

[11] Kiebler, E. W. and Woody, C., Journal of Educational Research, Vol. 7, Jan., 1923, pp. 50–58, "The Individual Laboratory *versus* the Demonstration Method of Teaching Physics."

[12] Works, George A., Modern Tendencies in Methods of College Teaching. (Unpublished.)

It is likely that the demonstration will furnish as much real opportunity for the expression of pupil initiative as the ordinary individual laboratory exercise. If the teacher "stages the demonstration" for the purpose of understanding and knowledge, pupils will be active (1) in observing what the teacher does and (2) in participating in the demonstration. In other words, the teacher will not do everything himself. He will have pupils assist whenever possible. Many types of exercises may be demonstrated by pupils who have had particular home advantages or special experiences, or who, because of aptitude, see the points of the demonstration more promptly and are therefore utilized to aid those who see the process less readily. Genuine expression of initiative is more often found in a well-directed demonstration, supplemented by discussion, than in the formal laboratory exercise.

4. Conducting demonstrations carefully.—There are several pitfalls in the use of the demonstration. The effect of a very successful demonstration or of a very unsuccessful demonstration has a marked effect upon pupil morale. If the demonstration does not make clear the process it is expected to show, it is likely that the "appreciation" effect of the exercise will be negative rather than positive. Upon the basis of a successful demonstration, an idea previously only half believed may be accepted for full value; but upon the basis of a faulty demonstration, it will probably be rejected entirely, even though true. The teacher should follow well-established practices.

In the first place, the teacher must regard the demonstration as a teaching exercise and not as a "mere" showing of something. This means that the pupil must be prepared to get the effects desired. It means, further, that the teacher must be ready to make clear whatever process he is showing; that is, he must be able to demonstrate. Usually, the time required to conduct a demonstration will not permit repetition, and, even if it did, the interest of the class will be held with great difficulty for a second trial. Exceptions to this statement

will be found in demonstrations that occupy only a few minutes and may therefore be repeated several times within a short period. The prestige of the teacher is likely to vanish when trials result in error. For this reason, the teacher will call upon experts in the community to perform many types of demonstration. The teacher who declined to demonstrate to George Brown how to castrate pigs, because George's father could do it much better, was wise. It may be that the teacher, in the course of his program of professional improvement, should perfect himself in this skill; however, his professional standing is not endangered if he omit this sort of demonstration from the list of exercises. The teacher must have ability to succeed.

In the second place, the exercise should be so staged that every pupil can participate, either in grasping the idea through the impressions made on his senses, or by actual participation in certain phases of the exercises. Only when the teacher's work is a pattern of excellence—because it is accurate, because it is presented with clearness and with only such dispatch as it will warrant, because it moves with steps within the range of the learner's grasp, and because it arouses the interest of the learner—does the demonstration fulfill its purpose.

5. Carrying use beyond things to meanings.—The essential purpose of the demonstration is to make ideas, principles, and processes clear. The teacher, therefore, can not be satisfied with performing. He must perform to some end. In choosing the demonstration as an appropriate method of making any given process clear, he should bear in mind that not every process involved needs to be demonstrated. The previous experience of the learner limits the appropriateness of demonstration. The pupil should move on from things and processes to meanings. The value of schooling is not only to promote the practical activities of the pupil's life, but to stimulate him to a reflective attitude on these activities. *Real* contacts with things and their manipulation are essential to

right interpretations; but "thinging it," when the thing is no longer needed, interferes with one's reflection on the more vital meanings inherent in things and processes.

DIRECTING STUDY

The theory that the teacher is merely a "hearer of lessons," is no longer held by educators. The teacher has become the promoter of a varied educational program, not the least part of which is the function of directing the pupil's study. The problem of directing and supervising study is embraced in that of conducting the 90-minute period.[13] Teachers are confronted with the responsibility of exacting from pupils an adequate minimum of study. The availability of the 90-minute period, or the vocational half-day, on account of the freedom which it permits, makes the administration of directed study not only very appropriate, but comparatively simple. The teacher should make the most of this opportunity.

Directed study, as a method of teaching, is essentially the setting up of a situation in which a maximum of conditions favorable to study prevail. Among these conditions are the following: (1) the room occupied during a given period is a study room, which creates an atmosphere of study; (2) there is a plan of study which prevails throughout the class, and holds the individual pupils to the task; (3) distractions are eliminated, so that the pupil's attention is not taken away from his work; (4) guidance is available at the time the need arises; (5) the plan lends itself to flexibility in study assignments and to optimum periods of concentration; and (6) it provides for motivation because of the relative directness of study.

[13] Directed study, more frequently called "supervised study" is designed to replace a part of the time spent in recitations and home study; to furnish more favorable conditions for study; and particularly to adapt school methods to individual needs. See special references at the end of the chapter for elaboration of this procedure.

1. Making the classroom a study room.—The growing emphasis upon study at school has been accentuated by the fact that most pupils have no real study place at home. Conditions are unfavorable for study there. The classroom as a study room is superior also to the library for most pupils. An investigation of the library study habits of freshmen in a state university library revealed that a large per cent of the student's time was occupied by his automatic, instinctive, or habitual responses to the distracting influences of the room. This points in part to the necessity of reducing the disturbing influences to a minimum. Making the physical environment conducive to study is the first step in directing study. This involves, in addition to the conditions of the room itself, economy in classrom organization and management; that is, routine factors that relate primarily to the manipulation of an increasingly complex school machinery must be reduced to a minimum, so that, as a part of good "school business," the learner's attention may be directed to problems of learning.

Well-arranged classroms, cabinets and seats placed with reference to efficiency, an equipment adequate and available for the work of the recitation hour, the control of the group through the dynamic character of the enterprise, all furnish the setting for study. A comparison of classroom activities reveals wide differences of practices. Some teachers, having materials ready and physical conditions under control, begin the work of the class promptly, the school room giving an air of businesslike activity; other teachers, seldom having things ready, take from five to ten minutes, if not more, in getting ready, in meeting interruptions because some piece of apparatus is misplaced or not in working order, some book is missing, or something else of vital necessity to the thoroughgoing work of the class is not at hand. Even though such a teacher may have many good qualities, the setting which he gives to the main business of learning contributes to looseness, carelessness, and inefficiency in study. Such teachers seldom finish the lesson set for the day in an efficient manner. It is best to provide a setting favorable to study and to insist upon an economic arrangement of all classroom activities.[14]

[14] Stewart, R. M., The Vocational Teacher and the Study Problem,

2. Providing a plan of study.—The plan of study embraces two points: first, the management phase, which is relatively uniform from day to day and is concerned with room equipment and supplies, books, habits of procedure, and the like; and, second, the teaching phase, which is concerned with the aim of the lesson and its development, and such variation of procedure as will make the particular aim of the lesson pivotal in the study. The second aspect, which is the special topic of this paragraph, involves the making of the assignment, either to the class as a whole or to individuals separately. How specific and detailed the directions should be depends upon the interests, needs, and capacities of pupils, their relative difficulties with the series of problem in the enterprise, their facility in the use of materials, including books and miscellaneous helps, and the newness of the procedures that are to be used.

The job-instruction sheet has been used extensively in teaching the problems of industrial education, and has been advocated for certain types of lessons in agriculture. This device affords rigid control of study. Though embodying many good principles, it may become the mere shadow of genuine study if not safeguarded properly. Its peculiar characteristic is its specificness of direction; that is, the plan embraces what is to be done, and is inclusive. The following skeleton is suggestive of such a plan, showing the relative fixity of the device. See page 144 for a completed form.

Lesson.—Selecting Feeds and Balancing the ration for Winter Feeding of Dairy Cows.

PROCEDURE

Obtain from your dealer the prices of dairy cattle feeds. *Get* these for both mixed and unmixed feeds.

Write to G. L. F. Exchange for the prices on their list of both mixed and unmixed dairy cattle feeds.

p. 7, published by the University of the State of New York, The State Department of Education.

List all these feeds and the prices per 100 pounds in columns 1 and 2 of a tabular form. (Form suggested.)

Find a table on page 73, Dairy Farming Projects, by Ladd. From this table *fill in* Column 3.

Calculate the amount of total nutrients.

Answer the following questions in your notebook.

Read pages 69–77 in Dairy Farming Projects. In your reading be sure that you understand such terms as digestible nutrients.

Answer the following questions.

Balance a ration.

Work out the nutritive ration.

3. Permitting no unnecessary distractions.—It is a wise procedure to hold to a rule of non-interference during specified study periods. Conditions that are beyond the teacher's control will sometimes arise; but his control of the teaching situation during the scheduled period of his class should never be interfered with by his colleagues—not even by his principal, except in emergencies. With high-school pupils, even small disturbances become serious distractions, for they interfere with the atmosphere of study.

4. Being available for guidance.—One of the dangers of the directed-study method is the possible tendency on the part of pupils to make the guidance of the teacher a sort of mental crutch. It is imperative, therefore, that the teacher study the individual characteristics of his pupils, so that guidance may be furnished to prevent wasteful trials and not to relieve the pupil of the necessity for intelligent effort. It is always an open question, how far the teacher should aid pupils. Directed study multiplies the teacher's opportunities for discovering what pupils need, and therefore should be a real contribution to the promotion of learning. It is well for the teacher to make guidance available, for the most part, at four points: first, in making the assignment, which involves the whole plan; second, in clarifying any difficulties that may arise subsequently in interpreting the main factors—the pivotal questions—in the light of the lesson purpose; third, in utilizing the new experience of study to make a generaliza-

tion; and fourth, in making satisfactory application of the truth of the generalization to new situations. Even in these points, discussion rather than mere telling should be utilized.

5. Making the study program flexible.—Like discussion, which supplements all forms and methods, the period of supervised study furnishes the opportunity for type studies. It may be a study of project plans, of survey forms, or of interpretations of forms. It may be a study lesson, a socialized assignment, or a summary of a previous discussion. It may be the means of integrating a series of lessons or a series of problems. It may be given to the specific inculcation of study habits which the study lesson suggests. It may well become the teacher's best opportunity to measure his teaching efficiency, to measure the progress of pupils, and to determine optimum conditions for study. Because it affords these means of control, which home study rarely yields, the directed-study period provides for flexibility and tends to promote better balance in the school program.

6. Providing for motivation through directness.—Pupils respond most readily to that which interests them. Methods of procedure as well as content must be adapted to the broader social needs of pupils. The job-instruction sheet, referred to above, has a strong appeal to pupils interested in manipulative dexterity in operative jobs. The selection of study problems that relate to the vocation, already emphasized in this book, has much to do with creating a spirit favorable to individual study. The problems that arise in community needs and the conscious needs of the pupils themselves supply the most significant basis for the stimulation of learning and studying. The association of the study period with the idea of doing the most undesirable of school tasks has robbed study of much of its possible usefulness. To provide *genuine* problems is the way to stimulate *genuine* study.

The directed-study plan tends to center teaching procedures in pupil needs. These needs are related to the statement of definite problems, to the selection of appropriate materials for

solving these problems, to the best modes of reading, taking notes, and cross-referencing, to the grasping of important points, to the improvement of pupils' methods of working, and to such other experiences as would tend to augment their interest in school and vocation.

LECTURING

The exposition or lecture method of teaching performs a similar function in the instruction of learners of all ages, although it attains its greatest importance in the lower grades of the public school, where it probably conforms more nearly to the needs of the learner than at any other stage in the educational process. This is because the telling grows out of *doing* and promotes *doing.* Kindergarten and primary teachers have a better chance to sense pupil needs than teachers of older children, since at these early ages individual differences of expression still fall so largely within the realm of sensory impressions. In the college or university, the lecture method has held sway largely because it serves the convenience of the lecturer, its value to students being determined largely by a specialized preparation on their part,—a *set,*—for the particular facts or principles which the teacher presents by lecture. The college student, like the kindergarten child, profits by the telling method, therefore, only insofar as the facts told fit into a program of doing.[15]

The history of the use of the lecture method shows that it has been very popular. There are apparently two main causes for this popularity: the stimulating effects of an enthusiastic and authoritative lecturer, and the learner's eagerness to obtain the particular information that the lecturer possesses. When printing was unknown or expensive, the

15 The College or University lecturer is likely to think entirely in terms of his logical organization of subject matter rather than in terms of the learner's difficulties. There is a growing skepticism as to the value of the lecture even in colleges. As a formal method, it has little place in the high school.

method of expository teaching was the principal means of conveying information, and, therefore, students flocked to hear men tell of "new things." With the multiplication of books, bulletins, and other helps, the lecture, considered as a distinctive method has become—at least for high-school teaching, if not for college teaching—the least effective form of instruction. Telling, however, will always be a special feature of classroom teaching.

The lecture method has declined because of the multiplication of better ways of adapting school instruction to the needs of the pupils. Discussion is an essential basis of determining what level of thought activity the pupil is able to maintain at any given time. In the lecture, the thought level is taken for granted, frequently without any intelligent consideration on the part of the teacher. The laboratory, survey, practicum, supervised study period, and other forms of first-hand participation provide an added stimulus to self-expression and give less weight to opinion or authoritative statements. The multiplication of books, bulletins, magazines, and other printed matter not only provides for an abundance and variety of content formerly available only by "word of mouth," but also furnishes an opportunity for selection in accordance with the suitability of the form and the particular needs of the pupil.

Another reason for this decline in the popularity of the lecture is the shift of the point of view in education from that of imparting information,—which the lecture method serves primarily,—to that of gaining experience and interpreting it. Education is a process of active prehension, rather than of passive assent. "It is a rare teacher whose lecturing is so appropriate to individual needs of his pupils, so directly appealing to their own experience, that any large proportion of his pupils is stimulated to activity that is as great as could be secured by other means of teaching."[16] As a phase of other methods, expository teaching is exceedingly valuable.

[16] Eaton, T. H., Vocational Education in Farming Occupations, p. 346.

To make the lecture method function to the best advantage, care should be given at least to the following points:

1. Integrating with other methods.
2. Adjusting to the needs of pupils.
3. Setting up appropriate objectives.
4. Providing for pupil activity.
5. Safeguarding the method against inherent dangers.

1. Integrating with other methods.—It goes without saying that the lecture method is rarely a distinctive method of high-school teaching. In fact, the methods of teaching must be adapted to pupil needs at every point in the teaching; therefore, the lecture is used as the most appropriate procedure only occasionally, though its intermittent use as a special form is common. It has the following outstanding advantages: the stimulating effect of an interesting lecturer upon the pupil; the facility with which materials and points of view may be adapted to the ends of instruction; the interpretation of difficult facts or principles; the presentation in economical form of data pertinent to problems under consideration which are not available economically in printed forms; and the opportunity given the teacher to control instruction in keeping with his own preparation.

2. Adjusting to the needs of pupils.—Teaching by the telling method grew out of the needs of pupils for facts and interpretations. This purpose may still be served by determining what needs of the pupils, at any given time, may be met by telling. The best type of telling, therefore, is that which inspires, supplements, clarifies, emphasizes, and interprets where the pupils' efforts fail. The lecture, when used as a *distinctive* method, can seldom be adjusted to the needs of the members of the class, except in the case of advanced students, who elect courses on the basis of their known preparation.

3. Setting up appropriate objectives.—The teacher of agriculture will plan to give some lectures, as suggested in

the above paragraph, but it will be with very definite purposes. The lecture should never be used merely as an alternative to having no method at all. In planning to furnish facts or interpretations by lecturing, the teacher should capitalize on the advantages of the method. It means enthusiasm on the part of the teacher for a new point, or a better interpretation, or a new way of undertaking a task. It means proper balance with other methods. It is an opportunity for setting an example in the use of good language, superior organization of materials, and good speech. It can stir to activity by the spontaneous character of the presentation. It forms the basis of the use of other methods and should stimulate pupils to self-activity.

4. Providing for pupil activity.—The outstanding criticism of the lecture method is that it does not provide for pupil activity. On the whole, this criticism holds; however, if the lecture method is selected only when the situation demands this type of instruction, certain desirable forms of activity appear. Activity may continue on thought levels through the suggestion of the spoken word. Where the spoken word is appropriate, it is an excellent means of stimulating activity. In the case of relatively immature pupils, the period of telling should be brief and should be alternated with other forms of presentation and with opportunities to use the information that has been imparted. "Informal talks pointing the way, indicating the significant points to seek, raising questions, defining them, and stimulating motivation undoubtedly serve a valuable purpose in learning, but as a purveyor of definite information they are of slight value." [17]

The term "developmental lecture" is used frequently to suggest a method of lecturing so devised as to utilize the questions and answers of pupils in the development of the lecture. In many respects it resembles the discussion; it may be regarded as the discussion modified to permit the teacher to advance more rapidly to the generalization than would be

[17] Bolton, F. E., Everyday Psychology for Teachers, p. 34.

possible with free discussion. The teacher consumes perhaps more than half of the time in lecturing, but the lecture is based upon an outline which is in the hands of pupils, and for the interpretation of which the pupils are responsible throughout the period. Pupils pay attention, if for no more important reason, in order to be ready to respond. This method involves preparation, or at least considerable experience upon which to draw. This procedure permits of wide usage and safeguards the method against many of the dangers which are mentioned in the next paragraph.

5. Safeguarding the method against inherent dangers.—The lecture provides, for the most part, for the *reflective* type of activity. This implies a satisfactory experience as a basis of reflection. The lecturer must take pains to see that the *telling* is in harmony with pupil experience, that the pupil is following the thread of the discussion in his thought movement, and that the main points are not submerged in high-sounding or over-embellished word settings.

The teacher should determine whether it is better pedagogically to give the facts and interpretations or to require pupils to find them in other ways. There is no merit in having the pupil find everything; in fact, it is good method to hold the pupil responsible for the main points of a lesson and then to assist him in getting details. The lecture furnishes a good way to give certain facts upon which programs of study and application may be made. It should not, however, be allowed to become a crutch for pupils who should discover facts for themselves. It should not permit a feeling of mental subservience on the part of the pupils.

Lecturing involves note-taking for the purpose of giving relative permanency to what has been said. There is always the danger that note-taking may become formal and therefore a more or less futile task. Pupils should not only be advised concerning this task but also trained to perform it. If lecturing is advisable in given teaching situations, pupils are entitled to know what procedure to follow in note-taking.

Some lectures require no notes; others, the main points only; and still others may require considerable detail. High-school pupils are not able to determine what sort of notes will meet the requirements of the teacher. Detailed note-taking from dictation is an exceedingly wasteful practice, unless the dictation is of a formula, a definition, or a significant fact for immediate use, and unless it is in an accurate form. The working over of notes, taken in accordance with the teacher's outline and certain supplementary references, makes the lectures much more valuable.

Colvin[18] makes an exceedingly good point when he says, "The real test of teaching ability is found when the teacher attempts to direct his pupils and develop in them the powers of initiative and response. It is a simple matter to tell a class a fact or explain to them some principle. It is a vastly different matter to make them comprehend it." It is imperative, therefore, that the teacher check himself against such a standard in order to break up any false notions, about his skill as a teacher, based on the ground that the pupils are good listeners. The teacher should be on guard against this and other dangers.

THE EXAMINATION

Unless the teacher follows a method of examination, it is impossible for him to know whether he is achieving the aims and purposes of his teaching. The examination, in one form or another, is a really significant instrument of instruction. The problem of measuring the progress of pupils has become so complex, and has remained so important, that the next chapter is given to a discussion of it.

[18] *Op. cit.* p. 228.

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Many references are available to students on the problems of this chapter. Only a few of these are suggested here.

BETTS, G. H., The Recitation (Houghton Mifflin).

The recitation, thought of more as a lesson than as a period of time, is discussed under five heads: (1) the purpose of the recitation, (2) the method of the recitation, (3) the art of questioning, (4) conditions necessary to a good recitation, and (5) the assignment of the lesson. This is a very clear treatment of the lesson as it is taught.

BURTON, W. H., Supervision and the Improvement of Teaching (Appleton).

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COLVIN, S. S., An Introduction to High School Teaching (Macmillan).

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The art of questioning is discussed in Chapter XX, pp. 465–474. Questioning is regarded as "an important factor in all types of recitation as well as in the directions prepared as guides to studying or to the interpretation of laboratory exercises."

STORMZAND, M. J., Progressive Methods of Teaching (Houghton Mifflin).
The author, in Chapter X, pp. 255–288, discusses the various forms of carrying on teaching in the class period. Particular emphasis is placed upon discussions and the socialized recitation. Considerable attention is given to the use of questions. In Chapter IV, the problem of study is presented in a helpful way.

THOMAS, F. W., Training for Effective Study (Houghton Mifflin).
This is presented by the author as a practical discussion of effective methods for training pupils to organize their study procedures. The author has done well to center the emphasis upon study as an integral part of the development of the lesson.

CHAPTER XV

MEASURING THE PUPIL'S PROGRESS

In the last chapter it was implied that the use of examinations and tests should be regarded as a method of teaching. Ordinarily, the examination is thought of as a means of checking pupils so that permanent marks may be recorded. The dominance of the idea of recording a permanent mark has, therefore, frequently overshadowed the more significant fact that the examination is an important instrument for the purpose (1) of adjusting yearly, monthly, and daily teaching plans, (2) of evaluating teaching, and (3) of giving reliable marks as evidence of progress in learning. In any case, the marks must be the result of a carefully prepared program of measurement, in which measuring is thought of as a significant part of the scheme of teaching.

Measuring the results of teaching furnishes a check on the achievements of pupils in the light of the aims and purposes which the teaching is intended to realize. In some kinds of work it is possible to state definitely just what has been accomplished, as in the measurement of progress in the acquisition of skill. In other forms of accomplishment, progress is a matter of the impressions made upon the pupil's mind, and these are exceedingly difficult to measure, since standards for most exercises are not available, nor would it be worth while to produce standards for them, since the conditions under which the measurement would be made could never be reproduced. Situations vary so much that great care must be exercised in making clear to pupils what is being measured. Random or skirmish tests are frequently made by teachers

as a basis of determining "commonness" of experience. These usually appear early in the term. If more of such tests were used from time to time, the teacher could well economize time (1) by not repeating what pupils have already gained in practical experience or in other courses, and (2) by making a better distribution of the total amount of time used in the various lessons.

Attempts have been made from time to time to set up types of examinations or tests for various kinds of results. For example, some workers in agricultural education have put great emphasis upon the financial returns of the supervised practical work, not only as the measure of the project work, but also as *the* measure of departmental results. A score card devised by Colvin, C., one-time supervisor for Agricultural Education, State of Illinois, for judging the results of progress in home projects includes the educational progress of the pupil as well as his financial success; as a matter of fact, only 10 per cent of the total score was assigned to economic income. Colvin has made clear a point which has already been made here, that is, that one of the values of the measuring instrument "lies in the analysis of the subject which accompanies the use of the card." He says, further, basing his statement upon letters received from college instructors, that "the greatest usefulness of the score card is to be found in its value as a guide in teaching, rather than as an instrument to measure objective results." His score card follows:

Score Card for Judging the Success or Failure of Pupils in Home Projects

Preliminary

16 A. *Plan*

1. Initiative	(Originality shown by the pupil in planning the project.)
2. Aim	(Such aims as economic gain, knowledge, credit, etc.)
3. Completeness	(Foresight of pupil indicated by details of plan.)

Execution

13 B. *Records*

1. Completeness	(Records of time spent, amount of reference reading, conclusions drawn, cost items, and profits.)
2. Neatness	
3. Accuracy	(Correct calculations, accuracy of detail.)

19 C. *Efficiency in performance*

1. Judgment	(Common sense in application and development of scientific principles.)
2. System	(Managerial skill in executing project as a whole.)
3. Punctuality	(Promptness in performance of processes, reporting, etc.)

Outcomes

10 D. *Economic Income*

1. Total net income	(Based on total investment.)
2. Percentage of profit	

12 E. *Skills*

1. Skills developed	(Number of different skills developed in the performance of the project.)
2. Facility in performance.	(Degree of skill developed in the processes involved.)

15 F. *Knowledge*

1. New subject matter	(Factual knowledge gained through the performance of processes.)
2. Social implications	(Knowledge which will aid the pupil in adjusting himself in the social group. Development of larger group consciousness.)
3. Related knowledge	(Facts of related value gained from reading, classroom and experience.)

15 G. *Attitudes*

1. Interest in work	(Inherent interest, growth of interest, and desire to continue work.)
2. Evidences of coöperation	(Desire to coöperate with teachers, parents, and fellow pupils.)
3. Interest in science	(Development and application of principles.)

In many departments, teachers have kept adequate records of all practicum exercises as well as of the supervised practical work. Such a record would include the number of exercises undertaken and the relative value of these exercises, in terms of processes involved, time required, and difficulties attending. It would include the number of different processes completed, as indicated above, and the degree of skill attained by the pupil. It would also show any application of principles made in new situations upon the pupil's own initiative.

Classroom examinations and tests are the more common form of measuring the progress of the pupil. There are many and varied types of tests, devised to meet an even greater variety of specific aims and purposes. Some of these aim to measure the pupil on an extensive block of work, and others are used for evaluating the work of the day or the completion of an exercise. The evaluation of the recitation is usually a subjective test and involves, in too many cases, the slavish use of a record book.[1] Much criticism has been launched at times against the examination, largely because too little care has been exercised in its use. There is no satisfactory reason why the teacher's teaching and the pupils' learning should not be subject to check. Furthermore, the idea of the examination is involved in every standard lesson plan in that generalization and application are essential parts of it. All

[1] The use of a record book in class as a means of stimulating study is hardly justified any longer when so many better means of stimulation are available. The record so made is too subjective and unsystematic to be of much value as a means of marking pupils. It is of doubtful value as a teaching device.

three types of examinations mentioned by Parker,[2] on remembering, on understanding, and on applying, have specific functions in every lesson plan and are an essential part of it. Subsequent tests to evaluate teaching and the work of pupils must be in keeping with teaching aims and purposes.

The following "Quarterly Test,"[3] given in the second year of agriculture, under date of November 9, 1925, is illustrative of the examination that measures all three types. Use will be made of this list to illustrate other special types of tests.[4]

QUARTERLY TEST SECOND YEAR AGRICULTURE

(Answer 10 Questions)

JOB: SPRAYING POTATOES FOR LATE BLIGHT.

1. Rank the farmers indicated in the form below as 1, 2, 3, 4, or 5, according to degree of success each attained in his control of blight for each sub-job listed, *a*, *b*, *c*, *d*. (Farmers were visited to study blight and its control.)

	Bates	Rice	Atwater	Parker	Townsend
a.					
b.					
c.					
d.					

(*a*) Selecting an effective and cheap spray rig.
(*b*) Making the stock solution.
(*c*) Spraying the fields efficiently.
(*d*) Control of blight and other diseases.

[2] Parker, S. C., Methods of Teaching in High Schools, pp. 497, 498.

[3] This examination given by E. R. Hoskins occupied three hours. Instruction had been given in the following enterprises, the crops as major and the animals as minor: potato, cabbage, home orchard, garden, poultry, and sheep.

[4] See pp. 336, 339.

Problem

2. (*a*) Pyrox contains 7 per cent copper and costs 50c. per pound. What formula of Bordeaux would 14 pounds make? Compare the cost of 14 pounds to 50 gallons of water with home-made Bordeaux.
   (*b*) Explain exactly the use of both materials in Bordeaux.

JOB: SELECTING SEED AND MARKETABLE POTATOES.

3. (*a*) Make out a potato score card on the basis of 100 points.
   (*b*) Explain how the score card conforms to market requirements.
   (*c*) Score a plate of potatoes on the desk by using your card.
4. (*a*) Distinguish between hill and mass selection.
   (*b*) Using Townsend's farm as an illustration, give advantages and disadvantages of each method.
   (*c*) Explain in detail the tuber-unit test used at Atwater's and
   (*d*) Explain the principles of plant breeding illustrated in the tests.

JOB: MARKETING THE CABBAGE CROP IN TRUMANSBURG.

5. Answer the following questions *briefly:*
   (*a*) What is the area for cabbage growing?
   (*b*) What is the cabbage cycle?
   (*c*) What is the average yield per acre, 1925?
   (*d*) What is the price per ton for kraut cabbage?
   (*e*) What is the kraut cabbage season?
   (*f*) Is there always a market for kraut cabbage?
   (*g*) Arrange four varieties in the order of their desirability for kraut.
   (*h*) Arrange four varieties in the order of their desirability for table use.
   (*i*) Give average market prices for shipping cabbage this season.
   (*j*) Who are the cabbage dealers?
   (*k*) How are *time, place* and *form* utilities illustrated in marketing cabbage?
6. (*a*) Give the steps in the manufacture of kraut from the time the cabbage reaches the yard until the barrels are loaded on the train.
   (*b*) Considering the capacity of the local kraut factory, the running expenses, and the price for kraut, what should be the profit per barrel in 1925? (Show all figures.)

JOB: RAISING ASPARAGUS.

7. Recalling the field trip to L. Robinson's farm, explain how Mr. Robinson does each of the following jobs:
   (*a*) Selects his varieties;
   (*b*) Propagates his plants;
   (*c*) Cultivates a bearing bed;
   (*d*) Cuts and markets the asparagus;
   (*e*) Cares for the beds in the fall.

JOB: LAYING OUT A GARDEN.

8. Recalling the field trip to Carpenter's truck farm at Waterburg, answer the following:
   (*a*) Give three examples of intercropping and planting distances.
   (*b*) Give two examples of companion cropping.
   (*c*) Give three examples of rotations in vegetable gardening.
   (*d*) Give desirable varieties of three vegetables to meet local market demands.

JOB: PLANNING A HOME ORCHARD.

9. Recalling the field trip to Herbert King's farm:
   (*a*) What varieties are suitable for a home orchard at Perry City?
   (*b*) Compare sod mulch with cultivation for a general farmer.
   (*c*) Indicate three ways of improving gardens and orchards on general farms near Ithaca in order to meet better the demand for fruit and vegetables for home use.

JOB: SELECTING LAYING HENS.

10. (*a*) Give the scale of points used in selecting poultry at Thomas' and Richards'.
    (*b*) Score one hen in the hall, using your scale of points.

CONDUCTING PROJECTS.

11. Recall your visits to the following poultry projects: Hardenbrook, Niemi, Reynolds, Sirrine.
    (*a*) Select the one you think is the best, considering all points.
    (*b*) Indicate the favorable and unfavorable points of the project selected.

General, Identification of Plant Diseases.

12. Taking the five disease specimens from the desk, fill in the following outline for each:
    (a) Name of the disease,
    (b) Cause of the disease,
    (c) Damage done to the plant,
    (d) Best control measures.

Even a cursory analysis of the above list of questions will show that a great variety of abilities are tested. Remembering, understanding, and applying, as types, are present conspicuously. As would be expected, questions of application are prominent. Applications of knowledge require remembering and understanding, and therefore all three are frequently involved in a single question. The choice of ten questions from the list of twelve gives recognition to special interests and likewise to differences in training, which the regular program permits. Pupils are given opportunity to express judgment, which can be evaluated without relying on the mere subjective judgment of the teacher. Information is asked for in significant situations which indicate its value. This examination is distinctively of the teaching type, for it compels the organization of experience. Being a review of essential principles, it requires reflection. It furnishes a basis of common understanding for teacher and pupil in subsequent efforts. It is not a perfect examination, for specific values were not assigned to questions and certain questions such as 6 may be of doubtful appropriateness. On the whole, however, it is a "good" set.

Other forms of tests may well be utilized in measuring the pupil's achievement in terms of the content involved in the above list. Special forms of questions are appropriate to special ends. The enumeration of a series, illustrated in Questions 3, 6, 8, and 9, and partially in other questions, is generally used to secure a broad organization of experience. The completion test, intended for occasional use, supplies a certain stimulus to the understanding of facts and principles. For

"drop" tests on assigned readings, it is particularly effective, especially if questions are not always taken verbatim from the book. In Question 4, reference is made to hill and mass selection of seed potatoes. The following sentence on this point, to be completed by the pupil, will illustrate the completion test.[5]

Mass selection or the selection of the best .... at harvest time, and the reservation of them for ...., accomplishes a much more gradual improvement (than individual selection). At the time of harvest .... hills are dug by hand and those carrying .... or more smooth, clean .... tubers of proper market size are reserved for planting next year.

For the first blank, either *individuals* or *hills* will do; however, if rote memory were being tested, the teacher would insist upon *individuals*. For the second blank, the word is *seed;* for the third, *desirable;* for the fourth, *six;* and for the fifth, *uniform.*

THE RIGHT-WRONG TEST

The right-wrong type of test is involved in all questions where choice must be made; however, its economical use is secured in lists of true or false statements. The pupil is asked to indicate by appropriate symbols, such as *R* or *W* for right or wrong, *T* or *F* for true or false, or yes or no, whether or not he agrees with the statement made. Though it has many undesirable features, such as suggesting misleading statements, requiring the categorical "yes" or "no," testing on very limited types of experience, and encouraging guessing, it has the advantage of "objectivity." A modified form permitting a conditional "yes" or "no," though interfering with its objectivity, makes it a more effective teaching device. The following statements, suggested in part by the content

[5] Cox, Joseph F., Crop Production and Soil Management, pp. 62, 329, 330.

of the examination questions given above, will serve to illustrate this type.

RIGHT AND WRONG TEST

(R) 1. The cabbage area includes practically the northeast quadrant of the patronage area.
(R) 2. The domestic varieties of cabbage are especially desirable for sauerkraut.
(W) 3. Cabbage does best on sandy and clay soils.
(R) 4. Prices of cabbage fluctuate greatly and the crop is a speculative one.
(W) 5. Cabbage seed beds should be planted very early to avoid root maggot.
(R) 6. Both large and small sizes of potatoes are objectionable for market.
(W) 7. During wet seasons, spraying of potatoes is unnecessary.
(W) 8. In order to control scab on potatoes, soak the whole potatoes for thirty minutes in a solution of arsenate of lead.
(W) 9. In selecting a variety of asparagus to grow, Colossal is decidedly better than Palmetto.
(R) 10. Lettuce and beets are a good example of companion crops.

THE ASSOCIATION TEST

The association test is not generally appropriate in agriculture; it is valuable, however, in perfecting certain bonds or connections,[6] which form the basis of the acquisition of skills. In such exercises as judging, studies of varieties, and studies of breeds, where the mental connection is relatively fixed, it may be used to advantage. Two types of association tests, based upon the content of the examination given on page 332, are illustrated below: in the first, *A*, one or several members of an association system are to be filled in; in the other, *B*, both members of the pair are given and the pupil is expected to indicate the correct connections.

[6] See Thorndike's "Educational Psychology," for the meaning of bonds and connections in learning.

The Association Test

A

(See Question 12 in the list)

Identification of Plant Diseases

Specimen	*Name of Disease*	*Cause of Disease*
1.	....	....
2.	....	....
3.	....	....
4.	....	....
5.	....	....
	Damage Done to Plant	*Best Control Measures*
1.	....	....
2.	....	....
3.	....	....
4.	....	....
5.	....	....

B

Connect each of the items in Column O with the item in Column P which makes the most appropriate association.[7]

Column O	*Column P*
Control of potato blight	Corrosive sublimate
The cabbage aphis	Lime
Potato scab	Sulphur dust
Club-root and black rot in cabbage	Bordeaux mixture
Rust in asparagus	Nicotine sulphate (with soap)

THE REASONING TEST

In view of the fact that examinations in agriculture will normally carry many problems of the application type, reasoning exercises form an important phase of testing. The above list illustrates this point very well. Reasoning is involved

[7] See Stormzand, Martin, J., Progressive Methods of Teaching, p. 313.

in the answering of Questions 1, 2, 3, 4, 9, and 11, to some extent in Questions 5 and 6, and possibly in others. No attempt will be made to illustrate this aspect of testing further.[8]

SUGGESTIONS FOR TEACHERS

It is evident that the examination has been accepted generally as one essential way of discovering the progress of pupils as well as of determining the effectiveness of instruction. It has been pointed out that methods of teaching have been devised from time to time, to afford more appropriate ways of gaining new experience. Likewise, new ways of examining pupils have been added, and old ways improved. A *good* examination will embrace many types of testing, designed to test, in the most appropriate manner, particular types of results which the purposes of the teaching imply. Attention to the following points will aid in making the measurement of results more helpful as an instrument of teaching:

1. Integrating measurement with the plan of instruction.
2. Preparing valid testing material.
3. Adapting directions to the needs of pupils.
4. Assigning marks intelligently.
5. Checking results with standard tests and objective scales.

1. Integrating measurement with the plan of instruction. —The emphasis upon supervised practical work, the extension of farm experience through surveys and other forms of teaching which require farm contacts, the organization of classroom instruction as well as "outside" instruction on a *doing* basis, and the integration of agriculture with the non-voca-

[8] Other forms of tests have been designed, but are not illustrated here; instead, the reader's attention is called to the references on measuring results. Several excellent discussions of this problem are now available.

tional part of the curriculum, all make for the importance of checking each type of results, and then correlating and coördinating these with the vocational objectives involved. Each special method tends to have its characteristic and appropriate outcomes. Sometimes these outcomes are a complex, as in the case of the project. Sometimes they are specific skills involved in performing some operative job, as in filing a saw, in culling non-layers, or in putting piston rings on a gas engine. Sometimes the outcomes are expressed in terms of the use of knowledge, rarely in the mere possession of knowledge. The means employed to measure the pupils' progress should, therefore, (1) test what the teaching meant to produce, and (2) be related to the realization of the purposes of the enterprise.

A review of the tests given in any year's work should show a composite of all types of educational results secured during the year. It should show the progress of pupils in each distinct type; that is, it should be a measure of progress of pupils and also a measure of relative progress by types of work. This would require a greater number of checks on individual pupils than teachers ordinarily take. Much of the inadequacy of examinations, in securing for the pupil a justifiable mark in a course, would disappear if teachers had a wider range of special types of checks on pupils and a better distribution of ratings from which to determine a term mark. The use of the examination as a means of discovering capacity, growth in ability, or rate of learning under standardized conditions makes it, in whatever form it appears, an essential part of instruction. No examination will ever be very valuable for instruction purposes unless it functions specifically in promoting the subsequent work of a course. The mark is incidental, and, if the teacher takes the proper view of the measurement of results, it will remain incidental.

2. Preparing valid testing material.—How much time would it take a teacher of agriculture to prepare the list of quarterly examination questions given above? The answer

depends upon whether or not this examination were a part of the instruction plan for the period covered. All sorts of evils appear in examinations because the making of the examination list bears such little relation to the instruction program. Selecting questions for examination is analogous to a farmer's selecting seed corn for his next year's crop. It is better to select the ear from a selected stalk in a particular hill which grew under typical conditions. The examination question should, in its place, be so selected. Hit-or-miss selection is likely to be disappointing. In view of the great variety of tests, some appropriate to one kind of learning experience and some to another, it is always advisable to note the respective experiences appropriate to the different forms of test as the program of study advances. From this accumulation of pertinent and effective material, a selection of examination questions can always be made with relatively desirable results.

As a check on the validity of testing material in agriculture, as in other fields of study, the teacher must always ask himself whether the tests devised are typical of those likely to occur in the course of vocational experience. This is not an easy task in certain aspects of study; however, for the most part, there is little excuse for giving questions as a mere test of mental acumen when it is possible to devise tests in vocational experience which serve incidentally as tests of mental acumen. The best check for validity is the correlation of tests with instruction and the emphasis upon the vocational purpose and the problems involved in the organization of instruction.

3. **Adapting directions to the needs of pupils.**—It is a vicious principle in testing, and one that weighs heavily in any general evaluating mark, to give tests without definiteness of understanding as to what is expected. Examinations may well be made up in specific sections with appropriate directions for each section. Directions should be limited to what is necessary for adequate understanding and should not be

strung along throughout the period upon the instigation of pupils' questions. A second consideration is that of fairness and honesty in "setting up" the questions so that they are straightforward and not ambiguous.

4. Assigning marks intelligently.—It has been shown conclusively in the literature of marks that it is extremely difficult to secure reliability in marking unless the tests are made objective. This is due to the large number of variable factors involved in the measuring situation, such as the need for accurate measuring, the character of the measuring instrument, care in the measuring, and the meaning of the results. Fine differences of merit are hard to see unless the teacher has a refined measuring instrument and uses it carefully. In loosely organized instruction, refined instruments of measurement would be entirely out of place. In such instruction, as McCall [9] has pointed out in discussing the accuracy of the teacher's judgment, the achievement of the pupil is often confused with conduct.

In the list of examination questions given on page 332, the teacher did not assign relative values to parts of questions. Evidently each question was valued at 10 points on the basis of 100. Unless the teacher assigns relative values to questions and parts of questions, the results cause all sorts of confusion and can rarely be used economically for advance teaching. Even though the values assigned in advance are arbitrary, or actually inaccurate at times, they do furnish a basis of common understanding and therefore make for greater reliability. A serious objection to the method of unassigned values, where questions are made up of several parts, lies in the fact that teachers have difficulty in maintaining a uniform standard of value while marking the papers. Subjective judgment in such a situation is likely to be at its worst.

To reduce this error, therefore, values should be assigned to parts in advance, the answers checked, and marks assigned

[9] McCall, Wm. A., How to Measure in Education, p. 58.

for each question by itself and frequently for each part of the question. The marks for each pupil should then be added and ranked from the highest to the lowest. Where two or more pupils happen to have the same numerical mark, their papers should be reviewed, and superior or inferior rank assigned on the basis of such secondary factors as are legitimate items of differentiation. For the purpose of stimulating individuals to greater achievement within the group and therefore for the group as a whole, a distribution of grades should be made according to some such graphic scheme as that indicated in Fig. 8. This gives each pupil his own rating within the group without making it known to any other pupil in the class. For example, the pupil who has a mark of 77, by counting back from 95, discovers that he ranks fifteenth in the class of 25. Ninety-five is first, and 62 is twenty-fifth. Where tests are like those given in previous years, the teacher can compare group results from year to year. This may well happen in agriculture, particularly in the checking of the acquisition of skills.

It is worth while for the teacher to be able to use simple statistical methods in dealing with the evaluation of the pupils' progress. Pupils become greatly interested when they can locate themselves on a "progress" map. In Fig. 8 each grade is given a distinct location on the "Frequency Surface," those of lower rank to the left and bottom, and those of higher rank to the right and top. The *curve* of *distribution,* indicated by the dotted boundary line in Fig. 8, is a valuable aid in showing in tabular form the distribution of individuals in the group. Column 5, with a value of 85, is the *crude* mode, since 7, the largest number of individuals, fall within that interval.[10] The *true* mode would fall below the crude mode because of the frequency in Col. 4 with a value of 80, and in Col. 2 with a value of 70; in other words, 12 individuals are below the modal column and only 5 above

[10] McCall, *op. cit.*, p. 365, says that the crude mode is the most frequent score.

it. In Fig. 8, there is the suggestion of the multi-modal curve in the frequency of scores in Col. 2. Fig. 8 varies considerably from the normal curve [11] of distribution, as

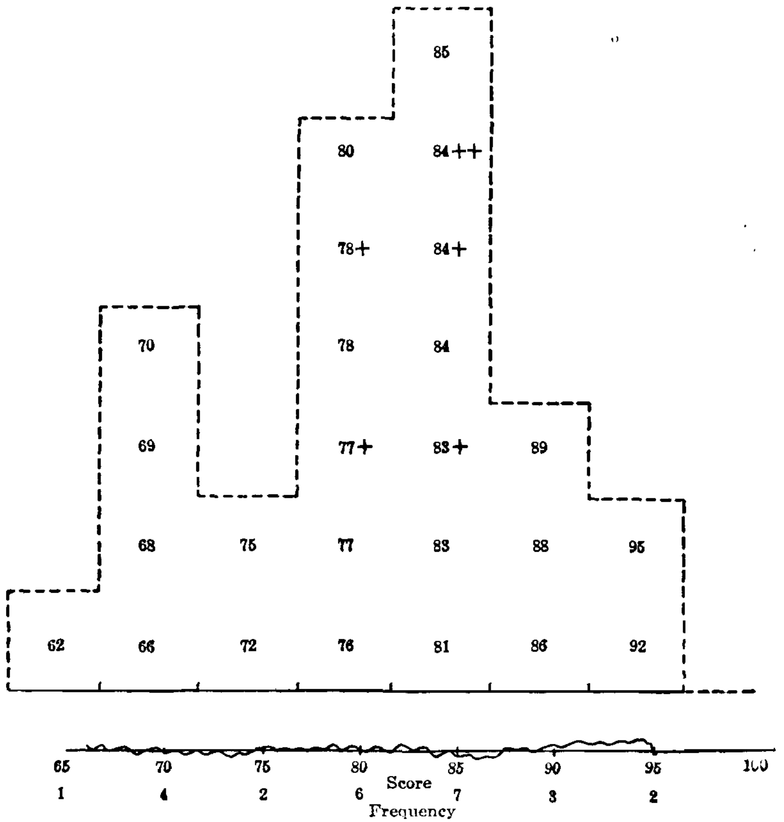

FIG. 8.—Distribution of Grades.

would be expected with as few as 25 scores. The simple *mean*, or arithmetical average, which is the quotient secured by dividing the number of scores into the sum of the scores, is a common expression of central tendency. In this case the

[11] See Rugg, H. O., Statistical Method Applied to Education, pp. 16–20.

average is 79.3. The *median* is the point in the series below which and above which there are an equal number of scores. By inspection, the median score is 80. For the methods of computation of point measures, the reader is advised to consult the special references.

It is clear that much of the error made in the assignment of marks could be eliminated by two procedures: (1) integrating the examination with the plan of teaching so that more appropriate tests may be used in measuring progress; and (2) submitting the marks to statistical treatment, at least occasionally, in order to maintain reference to norms of scientific procedure.

5. Checking results with standard tests and objective scales.—The standard test and the objective scale, as they have appeared in general education, are an expression of protest against the barrenness of the "marking system." The extreme variations in marking by teachers in the same subjects has created a desire for "objective measures."

McCall[12] says, "A test is perfectly reliable when identical results are secured from two applications of a test to some pupils by the *same* examiner. A test is perfectly objective when identical results are secured from two applications of the same test to the same pupil by *different* examiners. A test is perfectly subjective when no two examiners agree." Illustrations have been given above of "objectivity" in tests.

Colvin[13] says, "*Every teacher in the high school should familiarize himself with such scales as exist for measuring achievement in the subject which he teaches and should use these scales; when no such scales have been devised, the teacher should attempt to set up measures of his own that are as objective as possible.*"

Little has been done to establish scales for measuring progress in agriculture; therefore, every teacher should attempt something on his own account. Since pupils study agriculture in order to learn to *do,* the teacher should use

[12] *Op. cit.,* pp. 311, 312. [13] *Op. cit,* p. 160.

and devise, first of all, objective scales for measuring progress in the acquisition of skill and in the knowledge that functions in the various activities. Observation points to the inference that teachers are measuring their pupils more and more in terms of the objective standards which the vocation sets.

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CHAPTER XVI

GROWING PROFESSIONALLY

"*Continue to be a student and live the intellectual life,*" was the wise injunction of a university president in a recent address to a class about to receive graduating degrees. Application to tasks characterized by study is the distinctive activity of the college student; and this activity should be a dominating phase of his later life, if he would be a successful teacher. It may be assumed that the person who chooses teaching as a profession does so in part because he gets satisfaction in the process of learning and anticipates new satisfactions in stimulating others to learn. Unless he delights in study, why should he desire to teach? Study for professional improvement is imperative for *all* teachers. The teacher must perform his tasks in a social medium having two phases; one, the atmosphere of the school and the library; the other, the atmosphere of the community and the vocation. The ideal teacher must grow in both directions.

On account of the character of vocational education—and particularly of agricultural education,—the teacher can not confine his activities to classroom teaching. He must *grow* and *develop* to a point where he can have the confidence of his vocational constituents, the farmers. He must become a communicator of the ways and means of vocational progress; he must be able to discover persons upon whom he can place the responsibilties of maintaining the best farm practices, the best community relations, and the best farmer rights. The professional improvement of teachers of agriculture requires, first, discovery of facts and principles, and practice

in their use, as a means of meeting the normal and changing needs of workers in agriculture; and, second, the appreciation and development of the best methods of teaching these workers, in the light of needs and available facilities. The teacher's self-improvement is the result of his attack upon this two-fold problem. It is therefore more specific and direct, than college training, though college training may well be specific and direct if teaching situations involve "natural settings."

There is considerable evidence that teachers in very large numbers are taking advantage of the current means of self-improvement. The rapidly mounting summer-school enrollments, attendance at national, state, and local associations for educational purposes, the maintenance of societies and clubs for professional improvement, the provision for national, state, regional and local conferences, the establishment of itinerant teacher-training agencies, and community programs constitute such evidence. It is the purpose of this chapter to stimulate teachers of agriculture *to want* a self-improvement program that is spontaneous rather than forced, genuine rather than spurious. Eagerness for professional growth should supersede pressure from supervising school officials.

The program of self-improvement presents two general aspects, as pointed out in Chapter I: the first relates primarily to personal and social qualities, such as vitality, personal appearance, enthusiasm, and reserve; and the second, to professional matters, such as daily preparation, discipline, and instruction. Each of these aspects involves, on the one hand, the cultivation of those general qualities that go to make up a balanced, well-rounded, professional type of individual; and, on the other hand, the selection, development, and control of the particular qualities or combinations of qualities required for a specialized or definite service. This means that the teacher will train himself to be a more effective individual in his capacity as a teacher of agriculture, and incidentally to be a more complete embodiment of the general

qualities which society considers essential to the educated man. It means specifically that if he needs improved skills in performing certain types of teaching, he will undertake to develop such skills; that if he needs technical or other information, he will seek it; that if he needs to modify his attitude, he will endeavor to do so.

Who does not find each week, if not each day, some problem or question which he can not answer in a manner in keeping with his own standards of efficiency?

A certain teacher of agriculture accepted a position in a community where bean-growing was a major enterprise. He observed very early that questions began to come to him concerning bean diseases, and bean yields. He became concerned about it for, as he said, "I do not know *beans.*"

Another teacher, arriving in a community for his first teaching where the farms were over-run with noxious weeds, recognized that he was not adequately prepared. He said, "I am not able to identify the weeds, say nothing about a program of eradicating them."

An inexperienced teacher went into his first school with considerable enthusiasm and an excellent general preparation. He found that the classroom and the shop, the pupils,—in fact the entire setting of the school was distinctly below the standards of his "home" high school, and also below the standards of the school where he did his *directea* teaching.

In a class of fourteen pupils, the teacher was lecturing to the class on the "nitrogen cycle," when the state supervisor entered. It was a *good* lecture as lectures go. The supervisor raised the question whether the lecture was the most appropriate way to present such a topic. He suggested further that the teacher do three things: (1) test his class at the next period on the facts and principles which he expected them to get from the lecture; (2) examine the notebooks of the pupils carefully to discover what the pupils had recorded; and (3) report to him what he thought the advantages and disadvantages of the lecture method were in this particular case. These were the only points raised by the supervisor with reference to the teaching of this lesson.

Three types of situations that affect professional improvement are presented in the above cases. The alert teacher becomes aware of failure to accomplish the most satisfactory results. He moves (that is, he is motivated) to eliminate

the interference, or to improve the setting. He anticipates the satisfaction which comes with successful accomplishment, both from the standpoint of its personal and of its social reference. In the cases cited, the teachers acted as follows: The first teacher began to get facts from farmers, from growing fields of beans, from bulletins and books, concerning beans and bean-farming. The result was that the teacher who did not "know *beans*" in 1921, became chairman of a committee of vocational teachers on bean-growing in 1925. The second teacher followed the plan of identifying at least one noxious weed a day and of laying out a program of eradication. He kept this up until he had mastered all noxious weeds in his patronage area. The third began to formulate a plan for a better arrangement of cabinets, tables, and library, getting such assistance as he could from principal and pupils. He studied Morehouse's, "The Discipline of the School," which happened to be in the school library, reading particularly on the kind of offenses that are usually committed by high-school pupils. Six months of intelligently directed classroom practice all but revolutionized management standards in that department and had the same effect in other departments of the school. The following letter from the fourth teacher to the state supervisor reveals what issued from the few suggestions dropped by an intelligent and tactful supervisor.

Dear Mr. ————,

Do you remember the day you visited my department when I was lecturing on the "Nitrogen Cycle"? I shall never forget it—not because of what happened there, but from what I found out when I followed your advice. You advised me to test my class at the next period to discover how well they grasped the points of the lecture, and then to examine their notebooks. I certainly was surprised to find out how little they answered accurately, and then, when I examined their notebooks and found practically nothing intelligible I knew why you asked me to make the test. My instructors in education at the college had warned me against using the lecture method but most of my courses at college were conducted that way.

I looked up some references on selecting appropriate methods of teaching and I am satisfied that from now on my results are going to be more satisfactory. I wish you would send me some references on how to conduct discussion and to direct study. I have tried these as a substitute for the lecture when the work is done in the classroom and though results are better, I find that I do not handlе discussion so very well.

Thanking you for dropping in last month and hoping you will visit me again soon, I am,

Very sincerely,

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It is impracticable to tell in greater detail how these four teachers grew and developed professionally by attacking the problems at hand. It is likely that most teachers do some definite pieces of work for self-improvement. Back of the success of every growing teacher will be found records of planning, study, and work, similar to what has been described. As shown by these cases and others, the following practices will aid the teacher to formulate a definite program of self-improvement.

1. Setting apart a definite time for self-improvement.
2. Recognizing community demands and needs.
3. Relying upon oneself for projecting a plan and for executing it.
4. Selecting and following one's most worthwhile problems.
5. Limiting undertakings to what can be completed.
6. Making original studies when possible.
7. Developing a philosophy of life in accord with improvement and advancement.

1. Setting apart a definite time for self-improvement.—Experience has shown conclusively that the teacher's program of improvement must be provided for in the day's program if satisfying results are to be expected. It matters little when the teacher takes his time, and perhaps less how much time he takes; but it is imperative that it be set aside definitely.

Two attitudes may be taken: one may emphasize the self-improvement that comes from the normal preparation for the performance of the teaching duties of the day, or that which comes from the definite time allotted after the regular preparation has been made. It is the latter that this discussion emphasizes, since the former may be assumed for the regular teacher, even though he may not be following a special improvement program. It is likely, however, that in most cases no sharp distinction will be made. The latter attitude is characteristic of the person who seeks new facts, reorganizes, consults, and plans an advance which is definite. It has been demonstrated many times that the great men of the world are those who have devoted themselves consistently and methodically to a relatively fixed plan of self-improvement. The difference between mediocrity and superiority in teaching is frequently the result of just such a definite period of intensive study.

Scientific evidence supports a well-accepted notion that the time spent in learning may be reduced materially by giving attention to the control of the fundamental factors involved. Starch [1] indicates eight factors which, if controlled, would make it possible to accomplish much more in a given time and with less expenditure of energy. His list includes the following factors: (*a*) length and distribution of periods of work, (*b*) forgetting, (*c*) concentration, effort, and zeal, (*d*) specific practice in the functions to be improved, (*e*) definite knowledge of success and error, (*f*) interest in improvement, (*g*) mental imagery, and (*h*) fatigue. Unless the busy teacher integrates his program of self-improvement into his regular program of the day, the chances are that some or all of the above factors will militate against progress.

2. Recognizing community demands and needs.—All four of the cases cited grew out of community needs; two in the field of agriculture, and two in teaching. Our study problems are all of social origin and are specific. It was suggested

[1] Starch, D., Educational Psychology, Chapter XI.

in the above *paragraph, factor (d), that* the most rapid progress in learning is secured when specific connections are the goal of instruction. Our genuine problems originate in our felt needs as we seek to perform our tasks in a social medium,—in our need to know beans, *to identify* and eradicate weeds, to secure order and system in class work, to devise more appropriate ways of accomplishing desired results, as indicated above. If the problem relates to bean-growing, its solution involves a knowledge of best practices among farmers, of tendencies or direction of change, and similar factors. It is fortunate if the teacher feels "at home" with the problems of the particular community and unfortunate if he does not.

3. Relying upon oneself for projecting a plan and for executing it.—Two problems appear in connection with the plan: (*a*) projecting or devising a suitable program, and (*b*) executing it. One of the characteristics of the efficient teacher is his ability to *visualize*, that is, to project himself into the activities of society in order to evaluate ends, determine means and methods, and predict outcomes. The plan should therefore be the product of the active individual's reactions to the specific questions that for the time confront him. Then, whether we read, work with our hands, observe, or reflect, the relevant answers to our questions will tend to appear. Plans for improvement prepared by others, though valuable, are far less worthwhile than those which grow out of the individuals' needs as seen in the light of community practices and the demands of progress. Most of us may well become more responsible for our own improvement plans.

4. Selecting and following up one's most worthwhile problems.—The teacher's most worthwhile problems are (*a*) those that give promise of being most significant in the development of his work, and (*b*) those that are *troublesome*. It is a mark of economy to use the problems that arise in connection with teaching as the basis of professional improvement. A definite plan for the attack upon such problems is superior to general reading courses for improvement, and

superior oftentimes to attendance at summer schools, especially if attendance is secured under pressure. Such a plan, however, if it is to be effective, must be made on the basis of one's own situations of classroom or field, and with the avowed purpose of self-improvement. Nothing is more stimulating to the professional spirit of a teacher than to get on the trail of the solution of a socially significant problem. Such problems furnish the dynamics of study. It is not too much to expect that a wide-awake teacher of agriculture will find problems within the round of his teaching activities that will provoke genuine motives and interests. The *good* teacher is a "stirrer-up" of worthwhile problems. He is therefore an inspirer of pupils. It is but a step from teaching others how to study and develop to discovering these things for oneself.

5. Limiting undertakings to what can be completed.—In emphasizing specific problems rather than general problems in (2) above, one significant outcome is the relative immediateness of the results. Satisfying results are essential to continued effort in any direction. James has said [2] that one's self-esteem is dependent directly upon the relation of one's attempts to one's success. He says, "So our self-feeling in this world depends entirely on what we *back* ourselves to be and do. It is determined by the ratio of our actualities to our supposed potentialies; a fraction of which our pretensions are the denominator and the numerator our success: thus,

$$\text{Self-esteem} = \frac{\text{Success}}{\text{Pretensions}}$$

Such a fraction may be increased as well by diminishing the denominator as by increasing the numerator." Many a teacher has become discouraged in his program of improvement in service because the problem undertaken was too extensive

[2] James, William, Psychology, Briefer Course, p. 187.

for the time available, and therefore no satisfying results could be secured before interest had subsided or had been utilized elsewhere. Sometimes the problems taken up are too vague to warrant definite results, or are too complicated to call forth the continuous effort necessary to accomplish results. It is important, therefore, to limit one's undertakings to types of improvement which will likely yield success without much delay. The studies of beans and weeds mentioned are certainly of this type. The other cases cited likewise point to immediate results. When a problem has once been taken up in good faith and is reasonable, no minor difficulties in the way of its solution should be permitted to interfere with its completion. The teacher should set himself a reasonable undertaking and then carry it through to the end.

6. Making original studies when possible.—The classroom teacher will not be able to carry on research on any highly organized basis; however, the pressing problems of classroom teaching, already referred to, furnish an excellent approach to first-hand or original studies. It is likely that successful teaching will demand the observation, classification, and verification of data. This is the most genuine approach to effective research. Looking at the question from the standpoint of professional development, four types of problems appear and may be integrated into an improvement program. They relate to (*a*) pupil personnel, and the parents insofar as the school and home are brought together, (*b*) the conditions under which these pupils are getting their education, (*c*) the modification of curriculum offerings to pupils in order to utilize local materials in the content of instruction, and (*d*) the determination of a mode of classroom procedure that utilizes these new materials in teaching.

(*a*) In teaching agriculture,—as in teaching vocations generally,—the emphasis must center in the progress of the learner. A first-hand study of the patronage area, to determine certain facts, such as age, ability, and grade advancement in school of the persons in the area, distance from school,

and kind of roads, furnishes a setting for teaching that gives it new meanings. Problems of guidance, inspiration, ideals, and instruction tend to modify the teacher's attitudes when the facts of the case are available.

(*b*) It is impossible to evaluate one's pupil personnel without the consideration of the conditions under which pupils live. When the emphasis is upon subject matter, it is easy to overlook what is more important, the situations which home conditions create. Contact with pupils leads to the analysis of conditions. In the case of these country youths, conditions mean the kind of farms on which they live, the types of soils in which their crops must be grown, the types of farming in the community, and particularly the type of farming on the home farm, the types of social connections which they maintain, facilities for travel and transportation, and their general social and educational standards.

(*c*) A third type of original study is the formulation of a general outline of a series of courses of study which would (1) meet the needs of the pupils in the patronage area and (2) include recognition of the conditions of farming there. The coöperation of teachers in the work of modifying the curriculum offerings of the school is being emphasized not only by teachers of agriculture but also in the field of general education. Teachers of agriculture who are under the obligation of providing courses of study for their respective schools have an excellent opportunity to make their offerings significant by supporting their suggestions with the facts which study reveals.

(*d*) The logical necessity of modifying classroom method follows the availability of the facts which points (*a*), (*b*), and (*c*) yield. The immediate contacts with the school population, a better knowledge of soil and farm conditions, a glimpse into the social and religious life of the pupils, an understanding of their aspirations, and an attempt at curriculum modification reveal the necessity for a more vitalized program of instruction. The active coöperation of farmers,

whose friendship the teacher has gained in personal contacts, makes available many opportunities for first-hand study of farms as a basis of instruction. A better knowledge of the farms and their facilities opens up a new avenue of resources for instruction purposes. An understanding of soil conditions and types of farming makes possible the selection of many valuable materials for instruction and furnishes a better basis for discrimination in the emphasis placed upon facts. All of this gives rise to a better use of teaching facilities and provides for professional growth.

7. Developing a philosophy of life in accord with improvement and advancement.—Teachers prepared for the increasing number of positions which the multiplication of schools provides are scarce. It has always been so in this country. Our national slogan, "Universal education of minimum standard," has taxed our capacity to supply adequate teaching staffs. In a democracy it becomes a matter of stupendous concern to provide a program of education for all. In the face of inadequate preparation for this task, and the attending errors of instruction, American teachers have accomplished a great work, largely because they have been dominated on the whole by an expanding ideal and a philosophy of life that promotes growth. Great care must be used that in the *up-grading* of our teachers we do not permit any lapse in this dynamic quality in our ideals.

One outstanding difficulty which has always confronted the advance of education is the frequent *turn-over* that occurs among teachers. Teaching has been used too often as a *filler* for the gaps of life. The teaching force of the nation can not be looked upon as a permanent professional body as long as the greater part of the energy of educational administrators must be given to recruiting teachers and inspiring them to perform their initial service in harmony with the great purposes of the school. By more careful selection, the teacher's period of service may be gradually extended. The following suggestions are offered as part of a philosophy that makes

for improvement and tends to accomplish the purposes of education.

(*a*) The teacher should believe in his work as a calling, and should not, therefore, look upon teaching as merely temporary service but rather as a permanent responsibility which may lead in many directions. Devotion to a profession is fundamental to stable growth.

(*b*) The teacher should have an expanding ideal. The person who, because he has been graduated from a college, thinks that he now has something to give out, may lack one essential of a good teacher—a growing self. The advantage of the expanding ideal is, first, that it implies an end toward which the growing teacher is striving. This unifies his varied experiences and promotes efficiency. In the second place, the expanding ideal gives opportunity for the assignment of relative values to individual tasks and gives an increasingly better balance of one's strivings.

(*c*) The teacher must check his *personality* against the requirements of the task. Personality is not mere presence, nor is it personal magnetism. When harmonization among the various tendencies to self-expression is beginning to reveal itself, one glimpses the emergence of personality.[3] A *teaching* personality is one in which the harmonization focuses in such qualities as tend to stimulate youth to make desirable changes. Clapp[4] listed ten specific qualities of teaching personality on the basis of a study of replies from school officials. His list, in the order given by Bagley, is as follows: address, personal appearance, optimism, reserve, enthusiasm, fairness. sincerity, sympathy, vitality, scholarship. Bagley further supports Clapp's view that teaching personality *can* be changed. It is clear that the teacher, when once aware of

[3] Chapman, J. C. and Counts, G. S., Principles of Education, p. 141: "The process of integration of the minor personalities into a single harmonious self constitutes the essence of character formation and the emergence of personality."

[4] Reported by W. C. Bagley, School Discipline, pp. 30–35.

the factors in personality that affect teaching, can, under the stimulus of the desire for improvement, bring about significant changes in himself.

(*d*) The teacher has certain rights and duties. Every right demanded by the teacher implies an obligation. In a dynamic society, rights and duties are not available in finished molds, for life is a constant change, and many people are involved in its movement. The teacher desires freedom to work, to express his authority, to show results, in short, to be a real entity. The growing complexity of the school organization makes division of labor, coöperation, and coördination necessary. *The teacher works with restricted freedom; he expresses* his authority when it is not out of keeping with the authority of superiors; he tries to obtain results according to plans. It is highly desirable that the definition of rights and duties be made as clear as possible to the inexperienced teacher, so that he may live as one who *ought* rather than as one who *must*. The teacher should do new things because he thinks they are better than the things he has done before and because they point to a desirable goal in the "offing."

In closing, the authors wish to call attention to several duties which the teacher should regard as important. Regard for the instructions of supervisors is necessary to good order. The judgment of superiors may be wrong, and the teacher may wish to protest; but he should always coöperate with the principal in promoting the welfare of the school. He should seek to adjust himself to others and to *take* as well as *give*. He owes it to the school to render full service in a spirit of devotion, rather than to adopt the attitude of one doing "piece work." He should not be afraid that he will earn more than his stipend, for if he works in this spirit he will probably not earn even that. It is possible to fulfill these obligations and to render the specific services which the teacher owes, and still preserve one's freedom and allow sufficient scope for self-expression. Regard for the Golden Rule will promote a better service and inspire right attitudes toward

one's fellows. In his attitude toward contracts, in his professional ethics, in his community relations, and in his philosophy of life, the teacher should reveal the working out of an "expanding" ideal. Toward the members of his profession, toward organizations and professional societies. and toward authors whose experiences and reflections are expressed in books, bulletins, and magazines, the teacher should always manifest the respect that is due to worthy members of any vocation.

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APPENDIX

PUBLICATIONS OF THE FEDERAL BOARD FOR VOCATIONAL EDUCATION RELATING TO AGRICULTURAL EDUCATION

1. Statement of Policies.
13. Agricultural Education—Organization and Administration.
21. The Home Project as a Phase of Vocational Agricultural Education.
26. Agricultural Education—Some Problems in State Supervision.
53. Lessons in Plant Production for Southern Schools.
56. Lessons in Animal Production for Southern Schools.
68. A Unit Course in Swine Husbandry.
74. Analyzing a Potato Enterprise. Suggestions for Teachers.
75. Analyzing a Poultry Enterprise.
81. Rooms and Equipment for the Teaching of Vocational Agriculture in Secondary Schools.
82. Effectiveness of Vocational Education in Agriculture.
83. Supervised Practice in Agriculture.
84. Principles Underlying the Distribution of Aid to Vocational Education in Agriculture.
88. Analysis of the Management of a Farm Business.
89. Agricultural Evening Schools.
91. Job Lesson Units for Selected Truck and Fruit Crops Adapted to Southern Conditions.
94. Teacher-Training in Agriculture.
97. Promoting Vocational Education in Agriculture.
98. Principles in Making the Vocational Course of Study in Agriculture in the High School.
100. Student Teaching in Agriculture.
101. Analysis of the Management of a Corn-growing Enterprise.
103. Methods of Teaching as Applied to Vocational Education in Agriculture.
105. Analysis of the Management of a Cotton-Growing Enterprise.
108. Agricultural Part-time Schools.
111. Vocational Education in Agriculture for Negroes.

SUGGESTIONS TO VOCATIONAL PUPILS REGARDING THE SELECTION AND CONDUCT OF SUPERVISED PRACTICE.[1]

The purpose of agricultural instruction is to train students who wish to prepare for a farming occupation, to perform work skillfully, to conduct farm business successfully and intelligently and to become good citizens. School or book study alone can not accomplish this purpose. It is necessary that you as a student in agriculture carry through each year some definite home project or other supervised practical work in order to get the experiences and skill in labor business and management so necessary for success in farming.

This home project or practical work must be related to the work in agriculture studied in school. It should represent a large enough part of at least one of the important farm enterprises of the farming occupation in which you desire training to challenge your best efforts and it should extend over a complete production cycle.

It should be a piece of work that you really want to do, one that is worth while and one which you have a definite reason for doing.

This notebook does not include prepared forms because the work of each student represents different conditions. By adding loose sheets of paper properly punched and by punching similar holes in any forms prepared or adopted and by holding them in place by long spread fasteners the notebook may develop as your supervised practice grows.

There are four parts which every well kept supervised practice record should contain.

[1] In notebook, prepared by W. J. Weaver, Supervisor of Agricultural Education, Albany, New York.

1. State the purpose of your work. Each piece of work should have a purpose. At the beginning of this notebook you should write a paragraph telling in your own words what you propose to do. This statement should also indicate the larger worth while features which you have in mind in undertaking this work and should include your reasons for choosing this particular work.

2. As you study each job make a definite plan of work. After the statement of your purpose you should think through the work you have chosen and make a list of the jobs which you will likely have to perform. Arrange these jobs in the order that you will have to do them and number them.

In your classwork throughout the year these jobs will be studied. You should be interested in doing each job in the way that best meets your particular conditions. As soon as the study of the job is completed you should make a decision as to what is best for you to do. Then write in the notebook what you plan to do in enough detail to show clearly how the work will be done. Tell why you plan to do this job in this way. That is give the conditions and reasons which make this decision you have made seem best to you.

Do this for every job you study that is a part of your supervised farm work.

3. As you perform the work keep accurate records. The exact form of the records that you should keep will be determined by the nature of your supervised practice. These records will not be the same for all students. There are, however, three kinds of records which it is desirable to keep for all home projects or other supervised farm work.

(a) *General record.* As you do the work which you have planned you should make notes on experiences met and observations made. The effect of special conditions such as continued dry weather, late frost, dull market and others should be noted. When you perform the work if you decide

that certain changes from your original plan would make your work more successful, you should carry out the job according to these changes. You should, however, make a full statement in your notebook telling what these changes are and giving your reasons for making them.

(b) *Financial accounts.* The accounts that you desire to keep should be kept in this book. You may either rule your own forms, or use forms or account books already prepared if they seem to you to best meet your particular needs. If the latter are used you should make them a part of this book.

(c) *Special records.* These may include records of individual cows, egg records, breeding records, incubation records, feed records, price records, weather records and others. Those you will keep should be the ones that will be of use to you in accomplishing the purposes you have in mind in doing this work.

4. When the work has been completed study what you planned to do, what you did and what you accomplished and make plans for improvement. Farming is more than a one-year business. It extends over a long time. Most worth while projects or other supervised practice should also be continued. They should be chosen and planned with this in mind.

In summarizing your records and reviewing your plans and work, you should seek to find out why some practices failed and others succeeded. It is very important that you understand the principles or reasons for performing farm work in a particular way. If you know why work succeeded or failed you may improve your practice. In the notebook under a heading *Plans for next year* write the conclusions that you make as a result of your study of the past year's work. Explain briefly what changes you will put into effect in performing this work next year.

SUGGESTED OUTLINE FOR TAKING RECORDS OF YOUNG MEN ON FARMS

In the Community of.............School

1. Name
2. Date of birth—year, month, day
3. Name of father
4. Racial stock
5. Home post-office
6. School district—number, township, county
7. Location of farm
8. Size of farm
9. Ownership of farm
10. Roads to this high school, miles—macadam, gravel, dirt, total
11. Principal trading center
12. Nearest high school
13. Where now enrolled
14. Date left school—year, month
15. Reason for leaving
16. Last grade completed
17. Location of school last attended—district, township, county
18. Participation in farming—home farm, other farm
19. Types of farm work now performing—routine chores, operative work, managerial responsibilities
20. Other occupation during year—place, kind of work
21. Present financial returns
22. Extent of training for farming: High School agriculture—years. Junior project—years. Short courses—place, length. Farmers week
23. Occupation most desired
24. Names of other boys and young men on farm with ages
25. Names of girls and young women on this farm with ages

Miscellaneous Information

Prosperity of farmers in this section—excellent, fair, poor
Outlook for farming in this section—excellent, fair, poor
Hindrances—roads, soil, population, market
Vocational interests as expressed by this person
Community relationships of family—church, grange, farm bureau, lodges
His present opportunities or possibilities
Additional items and remarks
Record taken by—name, date

RECORD OF FARM ENTERPRISES

On a Farm in the Community of....................School

Farm No..........Operator..........School Dist..........Town..........County..........Distance and direction of farm from school..........Acres owned by operator..........Acres cash rented..........Acres share rented..........Total acres..........

Acres permanent pasture..........Acres woods pastured..........Acres not pastured..........

For the year beginning.........., 19..., and ending.........., 19..., give the information called for in the following table:

Crop	Area	Yield per acre	Total yield	Amount sold	Animal	Breed	Number	Number sold
Corn for grain					Dairy cows, grade			
Corn for silage					Dairy cows, pure-bred			
Fodder corn					Dairy heifers, grade			
Sweet corn					Dairy heifers, pure-bred			
Potatoes					Veal calves			
Field beans					Bulls, grade			
Cabbage					Bulls, pure-bred			
Root crops, kind					Beef cattle			
Buckwheat					Horses			
Oats and barley					Mules			
Oats and peas					Stallions			
Oats					Colts			
Barley					Ewes, breeding			
Winter wheat					Ewes, yearling			

Rye				
Alfalfa (No. cuttings)				
Hay, clover, timothy				
Oat hay				
Orchard fruit				
Small fruit				
Truck crops				

Bucks			
Lambs weaned			
Fattening sheep			
Brood sows			
Boars			
Other hogs			
Pigs, weaned			
Poultry: pure-bred			
Poultry: others			
Ducks			
Geese			
Turkeys			
Bees			

Note below special items concerning crop and animal enterprises such as kinds of seed grown for sale or own use, etc.

Prepared by the University of the State of New York. (Adapted from a blank prepared by the Department of Farm Management, New York State College of Agriculture.)

Forms may be secured from Lynk Brothers, 115 Beaver St., Albany, N. Y.

OVER

RECORD OF FARM ENTERPRISES

LIVESTOCK PRODUCTS

Milk Sold by Months		Total Products Sold	
MONTH	POUNDS	PRODUCT	AMOUNT
		Milk wholesaled	lbs.
		Cream wholesale, testing %	lbs.
		Milk retailed by farmer	qts.
		Cream retailed by farmer	qts.
		Butter	lbs.
		Skimmilk, buttermilk, cheese	
		Wool	lbs.
		Eggs	doz.
		Hatching eggs	
		Day old chicks	
		Breeding service, kind	
		Hides, kind	
Totals		Honey	

FARM EQUIPMENT (Check or indicate number)

Cultivator, walking	Hay fork and rope	Milk tester
Cultivator, riding	Hay loader	Brooder
Harrow, disc	Mower	Incubator
Harrow, spike	Potato digger	Anvil
Harrow, spring tooth	Potato sorter	Buzz saw

SUPPLEMENTARY INFORMATION

How much year help was employed?........................

How much month help was employed?........................

How much day help was employed?........................

How much work was done by piece workers?................

....

How much lumber and posts were sold?....................

How much maple sugar was sold?..........................

....

What kind and amount of fertilizer were purchased?..........

....

....

....

What kinds and amounts of lime were purchased?............

....

....

What kinds and amount of feed were purchasesd?............

....

....

....

What kinds and amounts of spray materials were purchased?....

....

Planker	Rake	Drill, post
Plow, walking	Reaper	Ditching machine
Plow, 2-way	Shredder	Emery wheel
Plow, sulky	Tedder	Engine, kind
Plow, gang	Thresher	Fanning mill
Cultipacker	Set heavy harness	Feed mill
Roller	Set light harness	Forge
Weeder	Single harness	Grind stone
Cabbage setter	Automobile	Harness stitching outfit
Corn planter, hand	Tractor	Lime spreader
Corn planter, horse	Bob sled	Manure spreader
Grain drill	Buggy	Scraper
Grass seeder	Carriage	Scales, kind
Marker	Cart	Soldering outfit
Potato cutter	Cutter	Sprayer
Potato shovel plow	Hay rack	Taps and dies
Potato hiller	Stone boat	Brace and bits
Potato planter	Wagon	Chisels
Bean harvester	Cooler and aerator	Level
Corn binder	Churn	Planes
Corn sheller	Milking machine	Saws
Ensilage cutter	Scales, milk	
Grain binder	Separator	

....

What kinds and amounts of seed were purchased?.............

....

....

Are the following repair and construction jobs done on the farm? Sharpening tools?.......Fitting and filing saws?.......Lacing belts?......Repairing harness?......Soldering?......Splicing rope?......Painting?......Riveting?......Drilling?......... Repairing windows?.......Shoeing horses?.......Cutting and fitting pipe?.......Mixing and using concrete?.......

....

What farm buildings, farm appliances, farm improvements or farm repairs were made on the farm without the aid of carpenter, plumber, mason or engineer?.............................

....

What kinds of soil are most common on the farm?.............

....

Give names and ages of any children living on the farm or persons interested in short course instruction.

....

....

....

....

OVER

INDEX

A

Activities, checking farm, 237
  operative and managerial, 137
Advance lesson, laying out, 189, 190
Advisory board, appointing and using, 50
Agreement, forms of, for project organization, 220–223
Agricultural education, opportunities in, 9
Agricultural regions of the United States, 26
Agricultural workers, movement of, 77
Agriculture, special schools of, 58
  vocational, place of, 55
Aims of agricultural education, data available, 106
  economic studies for, 27
  life activities embody, 21
  physical and economic factors, 24
Analysis, of content, 139–142
  of problem, 183, 184
  of project-enterprise, 227, 228
  of training content, 178
Annual plan of work, 43
Armstrong, F. E., cited, 128
Assignment of lesson, providing for, 189
  specimen, 181, 182
Association test, 337

B

Bagley, W. C., cited, 359
Bailey, L. H., cited, 11
Banks, L. J., cited, 277
Behrends, F. C., cited, 310
Bolton, F. E., cited, 166, 308, 323
Botsford, H. E., cited, 139, 310
Boys, elimination from school, 86
Brigham, C. C., cited, 83
Browning, Robert, quoted, 246
Buck, J. P., cited, 233
Burdge, H. G., cited, 73, 86, 89, 90

C

Capacities, specialization of, 35
Chapman, J. C., cited, 359
Charters, W. W., cited, 36, 37
Checking results, 182, 234, 235
Class examinations and tests, 331
Class instruction, 299–327
Club work, or junior project, 95
Colvin, C., cited, 329
Colvin, S. S., cited, 172, 188, 189 310, 345
Counts, G. S., cited, 359
Course of study, construction of, 105
  defined, 103
  for evening school groups, 143
  for part time groups, 143
  illustrations of, 132
  organization of, 135
  sources of aims of, 105
  steps in making, 105
  type of farming in relation to, 106
Cox, J. F., cited, 336
Curriculum, construction of, 102
  defined, 102
  difficulties in constructing, 56

D

Dearborn, N. H., cited, 154
Demonstration, carrying use beyond things to meanings, 314
  choosing appropriative illustrative materials, 309
  conducting carefully, 313
  determining teacher-pupil responsibilities, 312
  points to consider, 309
  providing, in natural settings, 311
  using, 307
Department of Agriculture in high school, college entrance from, 57
  extending the services of, 99
  organization of, 43
  place of, 55
  records of, 51
Descriptive lesson, plans, 174–182
Developmental lecture, 323
Dewey, John, cited, 2, 249, 266, 304, 311
Directed farm studies, 243, 244
Discipline, through projects, 255, 257
Discussion, correlating with other methods, 302
  example, 300
  making it serve definite purposes, 303
  points to consider, 302
  promoting an effective interchange of ideas, 305
  safe-guarding by a definite plan, 305
  teaching through, 299

E

Eaton, T. H., cited, 13, 71, 72, 73, 225, 267, 285, 321
Enterprises, arranging in courses, 122
Enterprises, form for studying, 368
  place in curriculum, 122
  survey of, 108
  unifying, placed late, 123
Evening classes, courses of study for, 143
  instruction outline for, 149
  organizing, 52, 53
Examination, method of teaching, 328
  specimen quarterly test, 332
Experience, evaluating pupil's, 165, 166

F

Factors, farming efficiency, 30
Farm and school, integrating, 204
Farm experience, directed, 236
  importance of, 68, 203, 204
  in lieu of project, 241
Farm jobs (*see* Jobs)
Farm shop, 272, 288
Farm studies, directed, 243, 244
Farming, determining types of, 106
Field, A. M., cited, 290
Field trip, 271, 294
Foard, R. W., cited, 150
Fulmer, C. A., cited, 69, 70
Functions of agricultural education, 31

G

Gentry, C. B., cited, 241
Guidance, in curriculum choice, 92
  in study, 318

H

Habit formation, 152
Hahn, R. L., cited, 174
    descriptive lesson plan, 174
Hamlin, H. M., cited, 277
Hoskins, E. R., cited, 132, 332

I

Individual and group projects, 205
Individual differences regarded, 63, 73, 252
Initiative, in teacher's growth, 354
  project provides for, 251–253
Instructional purposes, 162–165, 182, 183

J

James, William, cited, 355
Job instruction sheet, 144, 317
Jobs, analysis of, 123
  dairy cattle enterprise, 124

K

Kiebler, E. W., cited, 312

L

Laboratory method, 264–273
Lathrop, F. W., cited, 128, 136, 172
Lecture method, 320–325
Lesson assignment, 181, 182, 189
Logical method of approach, 38

Mc

McCall, W. A., cited, 342, 343, 345
McGregor, A. L., cited, 88
McMurry, C. A., cited, 246

M

Managerial farm jobs, 137
  partial outline of, 140
Marks, assigning intelligently, 342
Materials of instruction, arranging, 167–168
  selecting, 166–167
Measurement of pupil's progress, 328–347
  assigning marks, 342
  association test, 337
  completion test, 336
  reasoning test, 338
Measurement of pupil's progress,
  score card, projects, 329
  specimen test, 332
  suggestions for teachers, 339
  valid testing material, 340
Method, basic steps in, 159
  cases, illustrating, 159–161
  recognizing, 158
Miller, I. E., cited, 304
Motivation in projects, 249–251
Motor activity, 153
Myers, C. E., cited, 14

N

Notebook as a means of supervision, 229, 364

O

Operative activities, 137
  partial outline of, 142

P

Parker, S. C., cited, 268, 332
Part-time instruction, courses of study for, 143
  organization of, 52
Pearson, F. A., cited, 81
Peckstein, L. A., cited, 88
Planning the lesson, 171–191
Population, school, distribution, 66, 67
Practicum, 282–288
Prevocational instruction, problems of, 93
Professional growth, 348–362
Projects, application and utility, 254
  Assisting pupils in selection and organization, 216–225
  checking, 247
  continuation, 207, 214
  difficulties, 233
  evaluating as a teaching device, 245–263

Projects, financial arrangements, 223
forms of agreement, 220–223
illustration of, 205–214
individual differences regarded, 252
labor problems of, 224
limitations of, 261
motivation in, 249–251
plan and purpose, 219
"proper-size," 258
supervision of, 225–234
Psychological approach to aims, 38
Pupils, age and school distribution of, 65
aims of, 69
characteristics of part-time, 89
distribution of, in school, 85
factors affecting occupational choices, 75
guidance in curriculum choices, 92
individual differences of, 63
participation of, in projects, 217
psychological traits of, 87
understanding vocational, 62

Q

Questions, the use of good, 305

R

Reasoning test, 338
Rice, J. E., cited, 138, 310
Right-wrong test, 336
Riley, J. W., cited, 246
Robb, B. B., cited, 310
Rugg, H. O., cited, 344

S

Schedule of classes, preparation of, 45
School, as a selective agency, 83
attendance at 1920–24, 82
organization of the, 43
plot, 271
School, population, distribution, 66, 67
special agricultural, 58
Scientific point of view, 2
Special schools of agriculture, 58
Standard tests and objective scales, 345
Starch, D., cited, 353
Stewart, R. M., cited, 257, 316
Stormzand, M. J., cited, 338
Struck, F. T., cited, 128
Student organizations, 49
Study, directing, 315–320
Survey, form for making, 368
illustrations of, 115–120
pupil, 99, 367
special studies made by, 128
teaching device, 274–281
use of, in determining course aims, 108
in studying local farm enterprises, 112, 129

T

Teacher, of agriculture, problems of, 5
responsibilities of, 6, 360
qualities of, 1
Teaching facilities, providing, 48
Thinking, 155
Thorndike, E. L., cited, 65, 151, 154, 200, 268, 269
Time allotment, in course, building, 129
procedure in working, 130
Types of farming, source of course aims, 106

V

Vocation, choosing teaching as a, 1
Vocations recorded in the 1920 census, 21

W

Wallace, Henry, cited, 33
Warren, G. F., cited, 16, 81
Wheeler, J. T., cited, 301
    the ninety-minute period, 301
Whittemore, V. C., cited, 128, 129
    study of practices of dairy farmers, 128, 129
Williams, A. P., cited, 139
    analyzing content, 139
Williams, C. V., cited, 45, 235
Woody, C., cited, 312
Works, G. A., cited, 312

Y

Young, E. C., cited, 74, 77, 79, 80
    business relations between fathers and their sons, 79
    influence of size of farm on boys leaving farm, 79, 80
    movement of agricultural workers, 77
    occupations of men in counties of New York, 74
Young, P. R., cited, 96–98

1800